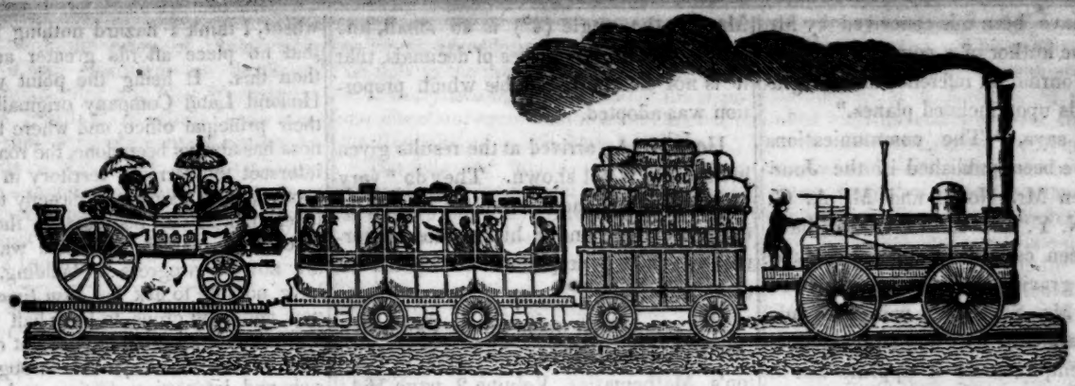


# AMERICAN RAILROAD JOURNAL,
## AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, MAY 20, 1837. [VOLUME VI—No. 20.

CONTENTS:

Harlem Railroad; Wilmington and Susquehanna Railroad; New-Jersey railroad ..... 305
Communication ..... 305
Rochester and Batavia railroad; Chenango railroad ..... 306
Greensville and Roanoke railway ..... 307
Transactions of the Institution of Civil Engineers 309
Egyptian Antiquities ..... 309
Electro-Magnetic Machine; etc ..... 312
Agriculture, etc ..... 315
Advertisements ..... 319

AMERICAN RAILROAD JOURNAL.
NEW-YORK, MAY 20, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William-street, and *opposite the Bank of America.*

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story.* It is desirable that the notice should specify their late and future residence.

HARLAEM RAILROAD.—We are pleased to perceive that the work on this road progresses to a close. It has indeed been a herculean work. Its excavations and embankments are probably heavier than on any other road in this country, of the same length; these, however, are but trifling affairs when compared with its TUNNEL, of over 600 feet, through solid rocks. This is a stupendous and very expensive work. It is now in a great state of forwardness, and will soon be the greatest curiosity and place of resort in the vicinity of New-York. The road is to be completed, we understand, in July, to Harlaem—when the cars will run through and do a large business. We shal be gratified to see it completed at the north end, as we shall then expect to see it brought down to the lower part of the city. It *must* and *will* be continued down into the business part of the city. It is less dangerous than stages—as there is no dodging from side to side. We again say that this road must be continued down into WHITE-HALL.

WILMINGTON AND SUSQUEHANNA RAILROAD.—We are happy to be able to notice the completion of another link in the great chain.

WILMINGBON, Del. May 9.

RAILROAD EXCURSION.—We attended the excursion given by the Wilmington and Susquehanna Railroad Company, on Friday last, and was much gratified with the same.—There were about 200 invited guests on board, citizens of this city and Philadelphia. The cars proceeded to within about a mile of the stupendous bridge erecting over Principio creek, and there remained until the party had sufficient time to visit this extensive piece of masonry. This bridge is the only important barrier in the way at present, and we were informed by Mr. Jones, the contractor, that it would be completed in about six weeks. The road is now finished to within four miles of the Susquehanna, and the whole distance to Baltimore will be ready for use about the fourth of July.

The company having enjoyed the refreshing virtues of the only liquor used in the construction of this bridge—cool spring water—returned to the cars where a portion of them partook of the hospitality of Mr Donergan, the able contractor on that portion of the road; and then returned to Elkton, where a sumptuous dinner was in waiting prepared by the Directors under the superintendance of that prince of caterers, Kincade. The hour being four and a half, P. M., ample justice was done to the same—and after a short discussion over the afterpieces the party proceeded homeward in good cheer.

This magnificent road, as far as constructed, is well made, and the country through which it passes is beautifully diversified by hills and dales, murmuring brooks, and gurgling rills, fierce running creeks, and the smooth face of North-East river, with a distant view of the Chesapeake, all tend to characterize it as one of the most pleasant routes of Railroad in the United States.—The cars are well constructed for the transportation of passengers, being airy and so arranged as to allow a walking passage through the whole train without inconvenience. The engines are of the first class, as an evidence of which, the distance from Elkton to Wilmington, 18 miles, was performed in 50 minutes.—[Baltimore Gaz.]

NEW-JERSEY RAILROAD.—Thus we progress.

This road is now completed for the use of the Locomotive from Bergen Hill about 2½ miles from the Hudson river, to East Brunswick, and the cars will commence running on Monday by *steam*—passing through Newark, and stopping at the Depot, foot of Market-street, for Newark passengers, and also leaving and returning to that point the same hours as heretofore.

The fare has been reduced from the Newark Depot to Jersey City to 25 cents, and Newark passengers will be carried to and from the Depot to meet the arrival and departure of the trains, if desired, on the town tracks, (which are underlet,) at 6¼ cents.—The fare has also been reduced from Jersey City to Elizabeth to 37½ cents, and to Rahway to 50 cents. Passengers will hereafter procure their tickets at the office.—[Newark Daily Advertiser.]

To the Editors of the Railroad Journal.

Gentlemen,—I have read with interest the communications in your Journal, from Mr. Steere and Mr. Norris, but without any desire to take part in a controversy which must be, or has already been, settled by experimental demonstrations; and my object now, is, merely to explain what ap-

pears to have been mis-conceived by Mr. Aldrich, the author of a communication in your last Journal, in reference to the "gravity of loads upon inclined planes."

Mr. A., says, "The communications which have been published in the Journal, between Mr. Norris and Mr. A. G. Steere of N. Y. and Erie Railroad, have probably been caused by the miscalculation of the gravity of loads upon inclined planes, by Mr. Steere, he, using the rule given by Pambour, the fallacy of which is very apparent, at least it appears not to give the result we wish to find, as it would give all the gravity on an angle of 45° which is impossible"

"I admit that the rule given is perfectly applicable, as it respects the velocities of falling bodies upon inclinations;"—

There is nothing new or peculiar in the rule used by Pambour for calculating the resistances caused by the gravity of loads; nor in the present case is there any need of discussing the laws of falling bodies. The rule is one demonstrated in all books of mechanics and is strictly a proposition in statics, as it may be and has repeatedly been shown, that when any power after having once been set in motion continues to draw a load up an incline with uniform velocity, the power and load are inequilibrium; and when the power is applied in a direction parallel to the surface of the plane the power and load are in the same proportion as the height and length of the plane. The correctness of this rule is almost universally admitted, it is the one used by Pambour, and does not by any means give the result stated by Mr. A., at an angle of 45°.

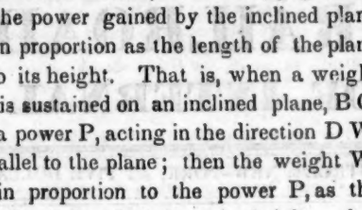
At an angle of 45° the length and height are as 1 to 0.7071068 or, the gravity of a ton will be little more than $\frac{7}{10}$ths of a ton instead of 1 ton as stated by Mr. A.

The ratio between the height and length of a plane is evidently one of equality when the plane is vertical; and it is equally evident that in such case, the ratio of the power and weight is that of equality, it being reduced to the equilibrium of two weights hanging over a pully.

The inclinations upon Railroads are generally so slight that the horizontal and absolute lengths will not differ sufficiently to require much, if any, correction for the measurements, which are made horizontally, and from Mr. A's result of the equality between the weight and power at 45° it would seem that he made the proportion between the power and weight equal to that between the height and base, instead of that between the height and length.—In the only other application of the rule by Mr. A., the angle (4°) is so small, and results have so few places of decimals, that it is not clearly discernible which proportion was adopted.

How Mr. A. arrived at the results given in his table, is not shown. They do "vary very much from the result of the rule" generally adopted; and if his method is correct, the fact is important and should be established.

The proposition upon which Pambour's rule is founded is thus enunciated in Hutton's Mathematics, Volume 2, page 164; "The power gained by the inclined plane is in proportion as the length of the plane is to its height. That is, when a weight W is sustained on an inclined plane, B C, by a power P, acting in the direction D W, parallel to the plane; then the weight W, is in proportion to the power P, as the length of the plane is to its height; that is, W: P:: B C: A B."

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ROCHESTER AND BATAVIA RAILROAD.—We are pleased to learn that this railroad is in a condition to permit Locomotives to pass upon it. The following letter published in the Courier, shows the importance of this road to the agricultural community, even by itself, but its present value is nothing compared with what it will be when continued westward to Buffalo, and eastward to Auburn, Syracuse and Utica, an event by no means distant.

BATAVIA, (Genesee Co.,)
May 5, 1837.

DEAR SIR,—The appearance here this morning of the first locomotive engine, with its train of cars, created quite an excitement among us, and for a while dispelled the gloom of "*hard times*," and re-animated the spirits of our citizens. The railroad, 34 miles in length, connects the flourishing city of Rochester with this village, and brings the two places within two hours ride of each other, at the same time opening a new avenue for the discharge of our surplus produce directly into the Erie canal. In an agricultural point of view, perhaps no portion of western New-York is richer in all the great elements of wealth, than the section immediately around us; and, aided by this road, we must contribute greatly to the advancement of the commercial interests of Rochester—to say nothing of the advantages to the country generally. As a point for the purchase of wheat, I think I hazard nothing in saying that no place affords greater advantages than this. It being the point where the Holland Land Company originally located their principal office, and where their business has always been done, the roads, which intersect the farming territory in every direction, have been made directly to this village, making it, necessarily, the *natural* place for a market. Suitable ware-houses are now in progress of building, and we have nothing to ask but *easy times* for money, and good crops, to keep half the flouring mills of the State in constant operation. The railroad itself passes through a very rich and interesting section, and is spoken of as among the most permanent and best constructed in the country,—offering to persons travelling in this quarter an agreeable change, either from the canal at Rochester, or from the usually travelled route by stage from Buffalo eastward. It cost for a single track, with suitable turnouts, three locomotive engines, passenger and freight cars, &c. &c., about $10,000 per mile, which has been furnished entirely by the individual means (with two or three exceptions) of persons resident in one or other of the two places it connects, and speaks well for their enterprising spirit. After this week the trips of the locomotives will be regular, and should any thing bring you this way, allow me to hope you will make it convenient to pass over the Rochester and Tonnewanda Railroad.

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From the Broome County Courier.

CHENANGO CANAL.—The superintendents have wisely adopted the prudent course of very gradually filling the canal with water. Though very firmly constructed, according to the opinions of the best judges, it was still necessary, as the strength of the banks was untried to test them. The water has been let in upon the whole line, and generally the work has stood firm. We have intelligence direct from the three divisions. Some little difficulty was experienced about the waste wiers, on the northern division, but the superintendent designed to put on a head of water again by Wednesday evening. The slight break which occurred last week, ten miles above Greene, is repaired, and the superintendent supposed that the banks there might be filled at the same time.—From that point to Binghamton, there is believed to be no defect. There is nearly a full head of water in our banks; and still it is probable, from one little obstacle and another, that several days will elapse before any boats will reach this village with goods.

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From the Kingston, Luzerne Co. Herald.

The public will be pleased to learn that Edwin A. Douglass, Esq., the accomplished Chief Engineer of the Lehigh Company, is now in the neighborhood of Wilkes-Barre with his assistants, exploring, surveying &c., preparatory to fixing the line from Wilkes Barre to White's Haven.—This is the last link in the chain of communication remaining to be accomplished, to connect the Anthracite Valley (or, as it is called, the great coal formation of Penn-

sylvania) with the cities of Philadelphia and New-York. Baltimore on the South West—Philadelphia and New-York on the South and South-East—these three rival cities we shall soon see contending for our trade, while at the North all the villages and cities spread over some thousands of miles of thickly populated and fertile country, will look to Wyoming for the luxury of a winter fire.

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From the Farmers' Register,

## ACCOUNT OF THE GREENSVILLE AND ROANOKE RAILWAY.

December 1st, 1836.

As the Greensville and Roanoke Railroad is about to go into operation, a concise account of its origin, location, construction, and probable revenue, may not be uninteresting to at least a portion of your readers.

To secure the trade, and bring to its own market the produce of the great and fertile valley of the Roanoke, has always been considered a matter of the greatest importance by the town of Petersburg. For this purpose, (among the first in this country, though still a new work,) was the Petersburg and Roanoke railway constructed—an improvement which has far surpassed the expectations of its warmest advocates. Blakely, on the Roanoke, and nearly four miles below the falls, was selected as the point of termination of this road. This work, however, had scarcely gone into operation, when the Portsmouth and Roanoke Railroad was projected, to connect the towns of Portsmouth and Weldon, (the latter place on the Roanoke, four miles above Blakely) the object of which was to divert this same trade to Portsmouth and Norfolk. The Petersburg interest, thus in danger of being cut off from the trade of the upper Roanoke, saw at once the necessity of a branch from their road, to some point on that river still higher up than Weldon; and for this purpose, a joint charter was obtained from the legislatures of Virginia and North Carolina, for a railroad from some point in the vicinity of Hicksford, in Greensville county, to Wilkins' ferry, (now Gaston,) fifteen miles above Weldon.

During the summer of the past year, the surveys were commenced, vigourously prosecuted, the location finally determined, and the work let for construction in the latter part of September.

The line of the Greensville and Roanoke Railroad leaves the most western point of the Petersburg road, about three miles south of Belfield, and after crossing Fontaine's creek, about two miles from its commencement, keeps on the ridge between that and Beaver creek, till it reaches the summit between the waters of the Meherrin and those of the Roanoke. The valley of a ravine, emptying into the latter, is there made use of, in the descent to the Roanoke. This location, the best that could possibly be obtained, is, on the whole, favorable; but yet, not as much so as the public might be led to suppose, from the term *ridge location*, in consequence of the sinuosities of this ridge at certain points.

This road is peculiarly adapted to the use of locomotive power, the curves being all short, and very gentle, and the grades easy, no where exceeding a rise of sixteen feet to the mile in the direction of the heavy trade, or of thirty-two feet to the mile in the opposite direction, except in the short descent to the Roanoke, of which more hereafter.

The following table will give the reader some idea of the curves, and the tangents, or straight lines, connecting them.

No. 1, is the junction of the Petersburg and Greensville roads—No. 17, is on the bank of the Roanoke; the other numbers are merely used to designate points of curve, and the terms *right* and *left*, are used on the supposition that the traveller is leaving Petersburg.

| | | |
|---|---|---|
| From No. 1—curve to right radius 2865 feet, | 3,000 | feet to |
| No. 2—straight, | 7,800 | feet |
| " 3—curve to left—radius 5730 feet, | 1,200 | " |
| No. 4—straight, | 19,200 | " |
| No. 5—curve to right—radius 5730 feet, | 800 | " |
| No. 6—straight, | 7,400 | " |
| No. 7—curve to left—radius 5730 feet, | 800 | " |
| No. 8—straight, | 4,000 | " |
| No. 9—curve to left—radius 5730 feet, | 3,200 | " |
| No. 10—straight, | 6,900 | " |
| No. 11—curve to right—radius 5730 feet, | 500 | " |
| No. 12—straight, | 18,300 | " |
| No. 13—curve to right—radius 2865 feet, | 2,100 | " |
| No. 14—straight, | 3,800 | " |
| No. 15—curve to left—radius 1910 feet, | 2,100 | " |
| No. 16—straight, | 12,400 | to |
| No. 17. | | |

From this table, we perceive that 79800 feet of this line are perfectly straight, and only 13700 curved, the whole length being 93500 feet, very nearly 18 miles. Again—of the curved portion, 6500 feet have a radius of 5730 feet—more than a mile; five thousand one hundred a radius of 2865 feet—more than half a mile; and only two thousand one hundred feet with a radius as small as 1910 feet. This last is the only objectionable curve on the line, and was necessarily adopted to avoid very heavy cutting. With the exception of these 2100 feet, a locomotive can pass as fast, and draw very nearly as heavy trains through the whole line, as though the road were perfectly straight.

As the numbers of the last table afford convenient marks of reference, let me here introduce a few remarks relative to the construction of the work, and the nature of the country through which it passes. Between points Nos. 1 and 2, nothing remarkable occurs—the whole consists of cutting from three to six feet—the soil principally clay. Between 2 and 3, is encountered a swamp, or highland slash, which was found very troublesome, being completely covered with water during winter and spring, and in summer, baked so hard, that a pick could scarcely penetrate the soil. The clearing through this swamp was very heavy. In this distance, also, is crossed Fontaine's creek. Over this stream is erected one of the handsomest stone structures in this country—now on the Raleigh and Gaston road. This viaduct is built of most beautiful granite, which was found in abundance at a distance of about three miles. At the roadway level, the bridge is one hundred and eighty feet long, and only six feet wide—the plate of the rail, being about forty-two feet above the surface of the water. The span, or archway, is sixty feet, and each abutment has a length of sixty feet. The abutments for the twenty feet next to the arch, are founded on solid rock, and have such a base, that with a batter, or slope, on each side, of one inch to the foot, they dwindle to a width of six feet, by the time they reach the level of the roadway. Over the whole is put a coping, beautifully cut, one foot in thickness, which projects on either side, six inches, which gives the bridge the appearance of being seven feet wide. This bridge is remarkable for its light and graceful appearance, being only seven feet deep from the top of the coping to the crown of the arch, or the stone work being only seven feet thick just above the crown or highest point of the arch, so that it looks as if it were actually suspended in the air. And yet there can be no manner of doubt as regards its strength or safety. The ring stones are two and a half deep, and measure two feet on the inner, and two feet two inches on the outer circle—the beds or joints of these ring-stones are cut perfectly smooth, as well as their faces, and they lie so nearly in contact, that it is almost impossible to run the blade of a knife between them. Such an arch supported by abutments sixty feet long, and founded on rock, will resist any pressure insufficient to crush the granite to dust. There are about one thousand eight hundred perches of stone in this structure, and the whole cost was about $10,500—which, when we consider that the stone had to be conveyed three miles, is very moderate. The embankment at either end of this bridge is very heavy—about thirty-six feet high, and in all, contains two thousand eight hundred cubic yards of earth.

From No. 4 to 5, there is a beautiful straight stretch of nearly four miles. The cutting in several places on this portion, is as much as twelve feet. Where the line crosses the head of Lynch's swamp, the ridge being much to the right, there is a very heavy embankment, thirty-four feet high in its deepest part, and containing nearly five thousand eight hundred cubic yards. Under this bank there is an arched culvert, (six feet span, ninety feet long, and containing three hundred to three hundred and fifty perches,) which is a most beautiful specimen of masonry. The cuts on this portion, were principally of clay. In them were sometimes encountered large isolated blocks of granite, measuring from five to ten feet in diameter, which had the appearance of having been, at one time, much subjected to the friction of water. At one place, also, the earth is impregnated with a good deal of iron ore, which rendered it exceedingly hard.

From No. 6 to 7, the first half is heavy cutting, the remainder a heavy bank. Here after sinking the cuts eight or ten feet, through clay, there was reached a stratum

of sand, which scarcely needed the plough or pick. On this portion is situated the first depot, seven and a half miles from the junction of the two roads, and midway between Belfield and Gaston.

The short curve from No. 7 to 8, is on a heavy bank.

From No. 8 to 15, which includes all that portion of the railroad from near Puckett's cross roads, to the summit, near the Roanoke, a distance of seven miles, the location is most favorable—the country at one time, undulating so gently and regularly, that the hills just serve to fill up the small valleys, and at another, so regular and level, that the roadway scrapes along the surface, sometimes a foot or two above, at others a fovt or to below. The texture of the soil, very sandy and light.

Between No. 12 and 13, there is a second depot. Another temporary depot is constructing at 15.

The curve from No. 13 to 14, brings you to the proper direction for striking the head of the ravine, by which the descent is made to the Roanoke, and the curve from 15 to 16, brings you into the direction of that ravine. This ravine is then followed to the flats of the the river, and the same straight line pursued across these flats, which are here three-fourths of a mile wide, to the river.

From 15 to a point one thousand four hundred feet south of 16, there is a heavy cut, as much as thirty-one feet deep in one place, and containing nearly seventy thousand cubic yards. The top is of a stiff clay the middle third stiff clay mixed with large gravel—and the lower third, a mixture of clay and sand—the sand however prevailing. Next to this cut, the work consist principally of heavy embankment, till you reach the flats, across which there is a bank averaging about eight feet high.

After passing through the last curve, or on reaching point No. 16, a spectacle no less remarkable than beautiful strikes the eye. The straight stretch of road does not stop at the river, but continues on in the same straight line, nearly to the summit on the other side—a thing unparelleled in the annals of railroads: not only that a perfectly straight line could be obtained in the descent on this side—but that a valley should be so disposed on the opposite side, that this straight line, continued, should afford the very best location for the ascent to the next summit and this too across a valley, the flats of which are two hundred feet below the summit on either side. This straight line, when completed, will be three and a half miles long, and the Roanoke bridge, when completed, which is now in the course of construction, will greatly add to the beauty of the view.

About the last seven hundred feet of the straight line between No. 16 and 17, is a part of the Raleigh and Gaston Railroad. Just before reaching the Roanoke, the Greensville road curves down the river and runs into a noble warehouse, which is now constructing, three hundred feet by sixty. —This depot is immediately on the water's edge, and the wharf, only fifteen feet wide, will reach water sufficiently deep to float the largest bateaux. Cranes will be fixed on the wharf for raising produce from the boats to the level of the floor of the warehouse, which is made as high as the beds of the cars, so that the produce can be loaded on them, with but little additional trouble or expense.

At the point where the continuation of this straight line strikes the Roanoke, the river is about one thousand feet wide at the water level. A bridge is now constructing across it, which will be completed in the course of the coming year—built on the plan of Townes' lattice bridge, with double lattice, to consist of six pans—the piers and abutments of the finest granite, which is found here in the greatest abundance. These piers and abutments will be founded on the solid rock which forms the bed of the river. Along the whole of this line, stone is found in great abundance and of the best quality. This was a most fortunate circumstance, for on the latter half of the road, the number of drains is almost unprecedented. Wherever the line varies the least from the summit of the ridge, the head of some small ravine is crossed, which calls for at least a dry stone drain. The item of hauling, even now, is very considerable, but had stone been scarce, or only found at a distance, the expense of all the masonry, would have been very much increased. This stone most frequently occurs in the shape of large isolatedb locks, chiefly of granite, varying much in degrees of hardness.

Located as this road is, between two creeks, an abundant supply of white oak sills was easily obtained. Rails had to be obtained at a greater distance; but the Petersburg Railroad and the Roanoke river furnished ready means for their delivery at either end of the line. Thence they had to be wagoned to the points at which they were wanting.

| Points of reference. | Elevation above tide. | Length of grade. | Rate per mile. | Total ascent or descent. | Ascends, descends, or is level. |
|---|---|---|---|---|---|
| 1 | 141.40 | 3219 | 19 | 11.50 | ascends |
| 2 | 192.90 | 4100 | 13.70 | 10.66 | descends |
| 3 | 142.24 | 1000 | level | 0.00 | level |
| 4 | 142.24 | 8750 | 32.20 | 53.37 | ascends |
| 5 | 195.61 | 2000 | 5.80 | 2.20 | descends |
| 6 | 193.41 | 8800 | 32.20 | 53.68 | ascends |
| 7 | 247.09 | 3000 | 15.84 | 9.00 | descends |
| 8 | 238.09 | 3824 | 32.20 | 23.33 | ascends |
| 9 | 261.42 | 5043 | 15.84 | 15.13 | descends |
| 10 | 246.29 | 6141 | 32.20 | 37.46 | ascends |
| 11 | 283.75 | 3150 | level | 0.00 | level |
| 12 | 283.75 | 3600 | 10.56 | 7.20 | descends |
| 13 | 276.55 | 3570 | level | 0.00 | level |
| 14 | 276.55 | 2100 | 24.82 | 9.87 | ascends |
| 15 | 286.42 | 6300 | 3.70 | 4.41 | ascends |
| 16 | 290.83 | 800 | level | 0.00 | level |
| 17 | 290.83 | 1800 | 12.67 | 4.32 | ascends |
| 18 | 295.15 | 2900 | level | 0.00 | level |
| 19 | 295.15 | 2800 | 12.67 | 6.72 | ascends |
| 20 | 301.87 | 2404 | level | 0.00 | level |
| 21 | 301·87 | 2200 | 16.37 | 6.82 | ascends |
| 22 | 308.69 | 2105 | level | 0.00 | level |
| 23 | 308.69 | 1500 | 50.16 | 14·25 | descends |
| 24 | 294.44 | 9100 | 93.45 | 161.41 | descends |
| 25 | 133.00 | 3200 | level | 0.00 | level |
| 26 | | | | | |

*Grades.*—The above table shows the beauty of the grades on this road. The first column contains mere points of reference, not corresponding to the similar numbers in the last table, but as those denoted points of curve, or changes of direction, so these the changes of grade. The second column, the elevation above tide water at Petersburg, of the point on the same line. The third, the length of grade from the point opposite, to the point in the next line. The fourth, the rate per mile. The fifth, the total ascent or descent in that distance. And the sixth, whether the grade rises, falls, or is level.

No. 1, is at the junction of the two roads. No. 26, at the Roanoke. From an inspection of this table, the reader will see that all the grades are as easy as is desirable, till we come to point No. 23. From 23 to 25, the grade is very heavy. At No. 1, you will perceive the elevation above tide, is 141.40 feet—at No. 23, 308.70 feet—and at 25, the elevation is 133 feet—about 8 feet below the point of commencement: so that from 23 to 25, a distance of only 10600 feet, the road had to descend through a greater space than it had risen in all the distance between 1 and 23. The great difficulty here, arises from the fact of the summit approaching so near the Roanoke, that enough *distance* is not allowed for an easier descent. Even with the present grade, there is as much as 30 feet cutting at its head, and 12 feet filling at its foot. Previously to locating this portion of the road, the whole neighboring country was examined, in hopes of a better descent; but every where the summit was found to approach too near the river. The country was also examined with a view to an inclined plane, with stationary power; but no location for such could be found, offering sufficient advantages to overcome the great objections always attendant on stationary power. As objectionable as this grade would be any where else, it is not attended with great disadvantages, situated as it is, so near the termination of the line. When the Raleigh and Gaston line is in operation, the locomotive which comes from Raleigh, having a head of steam, can, without expense, assist the Petersburg locomotive, with its train up this grade, and afterwards return to Gaston. The Petersburg locomotive, in like manner, when it arrives at the Roanoke, can perform the same good office for the Raleigh engine, on the south side of the Roanoke, inasmuch as quite a heavy grade is encountered there also, for the same reason. Again—a temporary depot with a turn-out, is fixing at the head of the grade, and a locomotive can, in two or three trips, take from Gaston to this depot, as much produce as it can carry thence to Petersburg, and the train may be thus formed on this turn-out, ready to connect to the engine bringing up the mail and passengers. A little experience will show the most economical method of managing the matter; but there can be no doubt that the grade adopted is infinitely preferable to the use of stationary power.

This grade will always be perfectly safe. For its superstructure, the largest timbers

were selected, and iron two and a half inches by three-eights, is used; there is no curve at its foot, and there is a level grade of nearly three-fourths of a mile, before reaching the river; so that even should a brake give way in the descent, there would be no danger of either running off, or of the passengers taking a cold bath in the Roanoke.

The construction not being completed, it would be premature now to estimate the total cost. But that deficiency may be supplied as soon as the work is finished, from the official accounts of actual expenditures for the road.*

*Revenue*.—I find Mr. Editor, that in these days, any railroad, or any railroad scheme, can be made on paper to yield a handsome revenue, so that under this head, I shall not resort to figures to make estimates of the future dividends which this road will probably yield, but merely satisfy myself with the statement of rather the sources, than the amount of its revenue. It will undoubtedly bring to market all the produce, (consisting of cotton, tobacco and small grain) of the upper Roanoke—the produce from a large portion of Northampton and Halifax, from Warren, Franklin, Wake, Chatham, Orange and Granville counties. To nearly all these, will merchandize and goods of various descriptions, be returned on this road. It will be a link in the great northern and southern mail routes, and of course, the transportation of the mail will be secured to it, as well as the great amount of travel which always accompanies, and will invariably stick to the mail. The local travelling, also, will be great. In fact, when I reflect, that in time, the Raleigh road is to be pushed south, that an improvement will be projected which will bring to this road the products of the rich lands of the Yadkin, and that the great western scheme, pushing itself into the very heart of Tennessee, and connecting with the Charleston and Cincinnati road, is to be connected at its eastern extremity with this work, I am completely at a loss to know what then would be the limit of its revenue, were none imposed by law.

The terms on which this work was let, and the manner in which it has been successfully prosecuted, is indeed a subject for congratulation with its friends. At the time it was let, a great number of public works were just about being commenced, and labor was very scarce. The demand for mechanics at the north was so great, that it was next to impossible to procure a good mason. Labor, during its whole construction, has continued very scarce, and consequently very high: provisions too, have reached a price almost unprecedented. If we add to all this, the unheard of winter and spring with which the road had to contend, we may well wonder at its steady progress towards completion. R. J.

* This communication was received early in December. The completion of the work has since been retarded much beyond the time then expected, by various unforeseen difficulties, which have increased the total cost to $227,000. The railway was opened entirely to the Roanoke, and its regular trade commenced on March 30th, 1837.—Ed. Far. Reg.

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Railroads in Belgium.—M. Nothomb, the Minister of Public Works in Belgium, has just laid before the Chamber of Representatives, a return of the railways to be formed in the kingdom at the expense of the Government. They extend along 115 leagues, having their central point at Mechlin. They consist of two principal lines, one from the French frontier to Antwerp by Brussels, and the other from Ostend to the frontier of Prussia near Aix la-Chapelle, by Ghent, Mechlin, Louvain, Liege, and Verviers. When the King of Prussia has authorised the projected elongation, Antwerp and Ostend will be brought into communication with the Rhine and Cologne.

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Egyptian Antiquities.—At the close of a series of lectures on Egyptian Antiquities, lately delivered at Exeter Hall, by Mr. Pettigrew, that gentleman unrolled a mummy, which had been presented for the occasion by Mr. Jones, of the Admiralty. This operation excited a marked feeling throughout the whole of the numerous auditory, including many individuals of distinction in the literary circles. In the commencement, Mr. Pettigrew noticed that the inscription on the outer case differed from that on the inner case containing the mummy. Both stated the party to have been a female; but the names and genealogies were different, and the latter stated the mother of the deceased to be living when her daughter died. It might be that the wrappings would settle the point; which, however, they did not, for no name was found on them, as often occurs. The mummy was Greco-Egyptian, and embalmed after the ancient manner—the bowels being extracted by an incision on the left flank, and the brains, probably, through the nostrils as the nose was much broken. The legs were separately bandaged, and the ankles bound by stripes of painted linen, about half an inch in breadth. The figures were not hieroglyphic, but simply ornamental.—Bands of the same kind surrounded the arms, which were crossed upon the breast; and a similar circle went round the neck. On each knee was a thin piece of gold, resembling the lotus flower; over each eye the providential eye of Osiris, of the same material; and another golden ornament upon the top of the ridge of the nose. There were rings on the fingers; but the opportunity was not sufficient for examining them, nor time for proceeding to the careful and laborious unrolling of the body to the end. The upper wrappers were not voluminous, and of coarse nankeen colored linen. Then came a complete envelope of asphaltus, and below that, the usual disposition and extent of linen rolls. On the soles of the feet were slight sandals, transversely striped black, white, and red, exactly like those painted on the bottom of the inner case. The finger and toe nails were gilt; and, altogether, the subject presented many objects for further investigation and study.

[Literary Gazette.]

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XVIII. Experiments of the resistance of bargesmoving on canals, by Henry R. Palmer, Esq., V. P. Inst. C. E. Addressed to the late President, Thomas Telford, Esq.

The statements that have been laid before the public in reference to the swift passage of boats along the Ardrossan Canal, having occasioned a renewal of, and more extended inquiry into the subject of the resistance to which the motion of boats and barges is exposed, I think it important that every useful fact relating to it should be collected and placed in the records of the Institution of Civil Engineers.

With this view I have transcribed the particulars of some experiments with which, through your kindness, I had the honor to be entrusted in the year 1824, when the comparison of the cost of conveyance by canals and railways constituted a popular question.

In the performance of the experiments referred to, I very soon perceived the difficulty of obtaining the results with that accuracy which was required.

The moving forces being animal power, one imperfection arose from the difficulty of preserving an equable motion. From the same cause I was unable to obtain, at will, any given velocity, so that the results might be obtained in the order required for a tabular registration. A third imperfection was occasioned by wind, which, however slight to the sensation, materially affected the results.

Considering, however, that the experiments were upon the large scale, that the circumstances affecting each are recorded, and that no assumptions were allowed to interfere, they are susceptible of some useful deductions, more especially when received, in comparative order, with facts which have been since and which may hereafter be obtained.

The purport of the experiments was entirely of a practical nature, and therefore they were tried by means strictly conformable with those actually in common use. The towing ropes were attached to the barges at the same parts as usual, the lengths of the ropes used were of the customary dimensions on each canal respectively, and the moving power exerted in the same position, viz., along the towing path on one side of the canal.

The results, therefore, do not exhibit precisely the resistances of the barges in a straight line, uninfluenced by the rudder, but that resistance which the circumstances oblige the horse to overcome, which from the obliquity of the line of force with that of the motion of the barge, gives an increased quantity in proportion. Although this error is of small magnitude, and will have little effect in the proportion of the results to each other, (which is an important feature in the experiments,) it may lead to incongruities in the comparison of these experiments with others determined by other means, if not attended to.

*Method used for ascertaining the Resistances of the Barges moving on Canals.*

A sheeve or pulley was suspended from the post to which the towing line is usually fastened, the towing line was then passed over that pulley, and the end of it fastened to the weights that were to indicate the re-

sistance; the barge was then towed in the usual manner, and the weight being always insufficient at the commencement, it was raised up to the pulley, and was suffered to remain so, until the barge appeared to be in a regular and uniform motion. Additional weights were then suspended, until they fell to about 12 inches from the pulley, when they were so adjusted as to remain suspended there, their only motion being a slight vertical vibration, occasioned by the stepping of the men employed to draw the line.

A straight part of the canal was chosen, and the length through which an experiment was continued was divided into equal parts, each being marked by a stake. The equality of the motion was therefore ascertained by the time occupied in passing each division, so that when the divisions of the whole space had been passed in equal times, and the weights had during the whole time remained within the same limits of vibration, the experiment was considered as having been fairly made.

The experiments being made on different canals, it was always found necessary to practice the men in drawing the barges, before they were found to walk with sufficient regularity, and the loss of time thus engaged caused frequent regret that soldiers could not be obtained for the purpose.

One of the experiments (No. 17) given in the Table was furnished to me by Mr. Bevan, the engineer to the Grand Junction Canal Company. In the four last I was favored with the assistance of Professor Barlow, the late Mr. Chapman of Newcastle, Mr. B. Donkin, and Mr. Bevan.

| No. Experiment. | Name of the Navigation. | Description of the Vessel. | Place of the Experiment. | Dimension of the Navigation. | Dimension of the Vessel. | Draught of Vessel. | Space of the Experiment. | Time of the Experiment. | Velocity in Miles. | Resistance, or moving Force. | Load, or useful effect. | Whole effect. | Fraction of Force to the Load. | Ditto, including the Barge. | Number of the Horses, Men, &c. | Observations. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Feet. | Ft. In. | Ft. In. | Chains. | Min'tes | Miles. | lbs. | Tons. | Tons. | | | | |
| 1. | Mersey and Irwell. | Packet. | Near Runcorn. | 48 wide 6 deep | 62 9 long 13 9 wide | 1 8 fr't 2 ab't | 79 | 12 | 4.9300 | 343 | 1.20 | 43½ | | | 3 | Vessels with masts and rigging. Surface exposed to wind much greater than that of ordinary canal barges. Canal irregular in depth. Wind at the time sensibly affected the experiments. Nos. 3 and 4 disturbed the water considerably. |
| 2. | Do. | Kent flat. | From Barton to Meadwheel Lock. | River | 64 10 / 14 6 | 4 1 | 165 | 48 | 2.5757 | 242 | 40 | 92 | 3/70 | 8 1/51 | 2 | |
| 3. | Do. | Haywood flat. | Old Quay to Meadwheel Lock. | Do. | Do. | 2 0 | 265 | 56 | 3.5378 | 140 | empty. | 52 | . . | 8 3/32 | 2 | |
| 4. | Do. | Do. | Meadwheel to Barton Lock. | Do. | Do. | 2 0 | 165 | 33 | 3.7575 | 140 | do. | 52 | . . | 8 3/32 | 2 | |
| 5. | Ellesmere. | Small boat. | Near Ellesmere. | 30 wide 6 deep | 69 long 3 6 wide | 2 5 | 36.8 | 6 | 4.6000 | 168 | 10 | 14½ | 1/133 | 1/193 | Men. | The only errors observable in the experiments on the Ellesmere Canal were attributable entirely to the wind, the effect of which is seen in the results. |
| 6. | Do. | Do. | Do. | Do. | Do. | Do. | 30.27 | 4 5/8 | 4.6900 | 170 | 10 | 14½ | 1/132 | 1/191 | Do. | |
| 7. | Do. | Do. | Do. | Do. | Do. | Do. | 30.27 | 6′ 15″ | 3.6300 | 77 | 15 | 10½ | 1/305 | 1/456 | Do. | |
| 8. | Do. | Do. | Do. | Do. | Do. | Do. | 39.27 | 7′ 40″ | 2.9600 | 50 | 10½ | 15 | 1/470 | 1/672 | Do. | |
| 9. | Do. | Common barge. | Do. | Do. | 68 6 long 7 0 wide | 1 8 fr't 2 7 ab't | 30.27 | 15′ 30″ | 1.9000 | 50 | 21 | 30 | 1/940 | 1/1344 | Do. | With the wind. |
| 10. | Do. | Do. | Do. | Do. | Do. | Do. | 39.27 | 10′ | 2.9450 | 66 | 10¾ | 19¾ | 1/365 | 1/710 | Do. | |
| 11. | Do. | Do. | Do. | Do. | Do. | Do. | 39.27 | 10′ 30″ | 2.8050 | 91 | 10¾ | 19¼ | 1/264 | 1/485 | Do. | |
| 12. | Do. | Do. | Do. | Do. | Do. | Do. | 39.27 | 10¼ | 2.7300 | 98 | 20¾ | 29¾ | 1/470 | 1/680 | Do. | Against the wind. |
| 13. | Do. | Do. | Do. | Do. | Do. | Do. | 39.27 | 9 | 3.2700 | 175 | 20¾ | 29¾ | 1/266 | 1/381 | Do. | |
| 14. | Do. | Two barges. | Do. | Do. | Do. | Do. | 39.37 | 10¼ | 2.8050 | 164 | 21 | 39 | 2/37 | 5/532 | Do. | |
| 15. | Do. | Do. | Do. | Do. | Do. | Do. | 18.63 | 5′ 25″ | 2.5800 | 172 | 21 | 39 | 2/173 | 5/507 | Do. | |
| 16. | Do. | Do. | Do. | Do. | Do. | Do. | 30.30 | 9′ 5″ | 2.5000 | 196 | 42 | 60 | 1/280 | 6/889 | Do. | |
| 17. | Grand Junction. | Common boat. | . . | . . | . . | . . | 10 miles | 4° 5′ | 2.45 | 80 | . . | 31 | . . | 8/618 | 1 Horses. | 1This experiment made by Mr. Bevan. 2Corrected for the effect of wind estimated at 4 lbs. The weight in both cases was 72 lbs. and the experiment was repeated with the barge turned about, merely for this comparison. |
| 18. | Do. | Do. | Paddington. | 45 wide 5 deep | 69 feet | . . | 10 chains. | 2′ 7″ | 3.64 | 80 | empty. | 6½ | . . | 1/181 | 2 Men. | |
| 19. | Do. | Do. | Do. | Do. | Do. | Do. | 10 „ | 4′ 35″ | 3.27 | 64 | do. | do. | . . | 3/218 | Do. | |
| 20. | Do. | Do. | Do. | Do. | Do. | Do. | 10 „ | 3′ 52″ | 3.87 | 308 | 21½ | 27 | . . | 2/103 | Men and horses. | |
| 21. | Do. | Do. | Do. | Do. | Do. | Do. | 10 „ | 6′ 8″ | 2.44 | 77 | 21½ | 27 | . . | 8/114 | Men. | There was no wind when the last two experiments were made. |

The following are the particulars of the last four experiments, made on the Grand Junction Canal, at Paddington, by Messrs. Barlow, Chapman, Donkin, and Palmer.

EXPERIMENT I.—Empty barge; weight, 6½ tons; force employed, 72 lbs.; fraction of the force to the whole effect, 2 1/05; wind in favor.

| Number of Stakes. | Time. | Time between the Stakes. | Velocity per hour in miles. |
|---|---|---|---|
| | ′ ″ | ″ | |
| 1 | 0 29 | 29 | 3.104 |
| 2 | 1 7 | 28 | 3.214 |
| 3 | 1 34 | 27 | 3.333 |
| 4 | 2 0 | 26 | 3.461 |
| 5 | 2 24 | 24 | 3.750 |
| 6 | 2 49 | 25 | 3.600 |
| 7 | 3 13 | 24 | 3.750 |
| 8 | 3 39 | 26 | 3.461 |
| 9 | 4 3 | 24 | 3.750 |
| 10 | 4 28 | 25 | 3.660 |
| 11 | 4 54 | 25 | 3.600 |
| 12 | 5 15 | 22 | 4.090 |
| 18 | 5 41 | 26 | 3.461 |

EXPERIMENT II.—Empty barge; weight, 6½ tons; force employed, 72 lbs.; fraction of the force to the whole effect, 2 1/05; against wind.

| Number of Stakes. | Time. | Time between the Stakes. | Velocity per hour, in miles. |
|---|---|---|---|
| | ′ ″ | ″ | |
| 12 | 0 33 | 33 | 2.727 |
| 11 | 1 2 | 29 | 3.104 |
| 10 | 1 29 | 27 | 3.333 |
| 9 | 1 56 | 27 | 3.333 |
| 8 | 2 24 | 28 | 3.214 |
| 7 | 2 51 | 27 | 3.333 |
| 6 | 3 18 | 27 | 3.333 |
| 5 | 3 45 | 27 | 3.333 |
| 4 | 4 11 | 26 | 3.461 |
| 3 | 4 40 | 29 | 3.104 |
| 2 | 5 8 | 28 | 3.214 |
| 1 | 5 37 | 29 | 3·104 |

EXPERIMENT III.—Load, 21½ tons, which, added to 6½ tons, the weight of the barge, gives 28 tons, the whole effect; fraction of force to whole effect, 2 1/03; force, 308 lbs.

| Number of Stakes. | Time. | Time between the Stakes. | Velocity per hour, in miles. |
|---|---|---|---|
| | ′ ″ | ″ | |
| 1 | 38 | 38 | 2.395 |
| 2 | 1 3 | 25 | 3.600 |
| 3 | 1 26½ | 23½ | 3.829 |
| 4 | 1 49½ | 23 | 3.918 |
| 5 | 2 12 | 22½ | 4.000 |
| 6 | 2 34½ | 22½ | 4.000 |
| 7 | 2 57½ | 23 | 3.829 |
| 8 | 3 21 | 23½ | 3.829 |
| 9 | 3 44½ | 23½ | 3.829 |
| 10 | 4 9 | 24½ | 3.673 |
| 11 | 4 32 | 23 | 3.918 |
| 12 | 4 56 | 24 | 3.750 |
| 13 | 5 19 | 23 | 3.918 |

EXPERIMENT IV.—Load, $2\frac{1}{2}$ tons + $6\frac{1}{2}$ tons = 28 tons, the whole effect; force employed, 77 lbs.; fraction of force to whole effect, $\frac{1}{8}\frac{1}{1}$.

| Number of Stakes. | Time. | Time between the Stakes. | Velocity per hour, in miles. |
|---|---|---|---|
| | ′ ″ | ′ ″ | |
| 1 | 1 6 | 1 6 | 1.363 |
| 2 | 1 54 | 48 | 1.875 |
| 3 | 2 $34\frac{1}{2}$ | 40 | 2.222 |
| 4 | 3 13 | $38\frac{1}{2}$ | 2.337 |
| 5 | 3 49 | 36 | 2.500 |
| 6 | 4 25 | 36 | 2.500 |
| 7 | 5 1 | 36 | 2.500 |
| 8 | 5 $37\frac{1}{2}$ | $36\frac{1}{2}$ | 2.465 |
| 9 | 6 15 | $37\frac{1}{2}$ | 2.400 |
| 10 | 6 $42\frac{1}{2}$ | $37\frac{1}{2}$ | 2.400 |
| 11 | 7 30 | $37\frac{1}{2}$ | 2.400 |
| 12 | 8 6 | 36 | 2.500 |
| 13 | 8 42 | 36 | 2.500 |

The weights with which the barges were loaded were those used for determining the gauge marks on the part of the Company.

The experiments on the Mersey and Irwell canal were made upon vessels that happened to arrive at the time without preference. The first was upon the packet which is used to convey passengers between Manchester and Runcorn, and is usually towed at the rate of $5\frac{1}{4}$ miles per hour.

Nos. 5, 6, 7, and 8 were made on the Ellesmere canal, with a boat built for the purpose, and which was of the same length as those commonly used, but exactly half their width

Nos. 9, 10, 11, 12, and 13, were made with one of the ordinary canal barges.

Nos. 14, 15, and 16, were made with two boats joined together end to end, and the curves, to the head of one and the stern of the other, so planked over as to form one boat of double the ordinary length.

No. 17, having been made by Mr. Bevan,

TABLE OF THE DIMENSIONS OF THE BARGES USED ON THE GRAND JUNCTION CANAL.

| Distance from the head of the barge. | Greatest width at the several distances. | Width inside at the several distances. | Depth below water. | | Depth above water. | | Girt at the several distances. |
|---|---|---|---|---|---|---|---|
| | | | on the one side. | on the other. | on the one side. | on the other. | |
| Feet. | Feet. In. | Feet. In. | Inches. | Inches. | Inches. | Inches. | Feet. In. |
| 5 | 5 $3\frac{1}{2}$ | 1 10 | ... | ... | 35.3 | 36.0 | 10 $3\frac{1}{2}$ |
| 10 | 6 6 | 4 2 | 9.2 | 8.5 | 32.9 | 33.1 | 11 $10\frac{1}{2}$ |
| 15 | 6 $8\frac{1}{2}$ | 5 7 | ... | ... | 31.5 | 32.2 | 13 0 |
| 20 | 6 $7\frac{3}{4}$ | 5 11 | 9.6 | 8.4 | 31.5 | 32.3 | 13 $1\frac{1}{2}$ |
| 25 | 6 8 | 6 0 | ... | ... | 31.4 | 31.9 | 13 2 |
| 30 | 6 9 | 6 0 | ... | ... | 31.1 | 31.4 | 13 2 |
| 35 | 6 $8\frac{1}{4}$ | 6 0 | ... | ... | 30.0 | 31.4 | 13 2 |
| 40 | 6 8 | 6 0 | 9.8 | 8.9 | 31.1 | 31.7 | 13 2 |
| 45 | 6 $7\frac{1}{2}$ | 6 0 | .1 | ... | 31.0 | 31.8 | 13 $2\frac{1}{2}$ |
| 50 | 6 8 | 5 11 | 11.1 | 9.3 | 30.9 | 31.4 | 13 $2\frac{1}{4}$ |
| 55 | 6 9 | 5 1 | ... | ... | 31.4 | 31.8 | 12 9 |
| 60 | ... | 4 2 | 9.7 | 9.0 | 32.9 | 33.1 | 11 3 |
| 65 | ... | 1 10 | ... | .. | 36.8 | 37.3 | 9 7 |

69 feet the whole length, not including the rudder.

I have no other information relating to it than the facts as given in the table.

Nos. 18, 19, 20, and 21, were tried under circumstances as favorable as are usually met with; the effect of the wind was, however, very apparent.

Every variation in the resistance through all the experiments was easily discernible when it amounted to six ounces, and sometimes less.

In conclusion, I think it necessary to remark, that in such experiments as these which have been described, the action of the wind, whether in favor or opposed to the motion of the vessel, should receive the nicest attention. The difficulty does not consist only in ascertaining the amount of the atmospheric action at any given time, but in making a due allowance for its variations during the time of one experiment: still weather should be chosen for the purpose, and the experiments should be made early in the morning, before any sensible wind has arisen.

The above experiments were submitted to Peter Barlow, Esq., F. R. S., and the following are the deductions he made from them.

*Report of Peter Barlow, Esq., F. R. S., on the Experiments of Henry R. Palmer, on the resistance of Barges on Canals, etc.*

In order to reduce the law of resistances from the foregoing experiments, it is requisite that the comparison should be made between those on the same boat and under the same circumstances; for the resistance opposed to different boats will depend on their transverse sections, their draught of water, the section of the canal, and various other circumstances, which will prevent the deduction of any general law applicable to all cases.

Mr. Palmer states that the first four experiments on the Ellesmere canal, with a small boat, were made under particularly favorable circumstances of weather, &c. These therefore may be employed for deducing the law of the resistances, as it depends on velocity.

It is generally assumed, on the common theory of fluids, that the resistance varies as the square of the velocity, but it has been found that this law does not obtain in practice, and different experimenters have obtained different results, varying from the 2d to the $\frac{3}{2}$ power of the velocity. It will appear, however, from the following investigations, that in the case of loaded canal boats, it varies in a still higher ratio, viz., as the cube of the velocity very nearly, if not exactly. In order to make this comparison, it is only necessary to proceed as below, by saying,

$$V^m : v^m :: F : f.$$

using for V, $v$, F, $f$, the actual velocity and moving powers employed.

From this proportion is very easily obtained the theorem $m = \frac{\log F - \log f}{\log V - \log v}$; and employing in this the velocities and forces given in the first four experiments, there is obtained the following results, comparing the experiment

1 to 3 . . . . $m = 3.2$
1 to 4 . . . . $m = 2.7$
2 to 3 . . . . $m = 3.0$
2 to 4 . . . . $m = 2.6$

Mean value of $m = 2.9$ or 3 nearly.

By comparing experiments 7 and 8, which are made under like circumstances and on the same boat, we find $m = 3.2$, and in the same way experiments 17 and 18 give nearly the same result, viz., $m = 3.0$, the general mean being $m = 3.0$

It is clear, therefore, that, whatever may be the deduction from theory, the actual resistance of canal boats varies very nearly as the cubes of the velocities; and, by adopting this law, the velocities due to any force and load may be computed from the velocity and resistance in any other case being given.

And as it will be seen by the experiments on the different railways, that at a mean, one lb. will draw along 180 lbs., and that a power of 1 to 200 is the greatest that the most perfect railway can ever be expected to attain; I have computed what velocity is attainable on a canal answering to those two cases, viz., when the moving force is $\frac{1}{1}\frac{1}{0}\frac{1}{0}$th part of the whole load moved. These results are given in the following table, omitting those made on empty boats and seagoing barges.

It is clear, therefore, that on a canal, when the moving power is $\frac{1}{2}\frac{1}{0}\frac{1}{0}$th of the whole load, including the barge, it may be taken forward at the rate of 4 miles per hour, and that when the force is $\frac{1}{1}\frac{1}{8}\frac{1}{0}$th, the rate of transfer will be $4\frac{1}{2}$ miles per hour. It is easy also, from what has now been stated, to compute the power on a canal, at different velocities: for example,

| At 4 miles per hour, 1 lb. will draw 200 lbs. | |
|---|---|
| $3\frac{3}{4}$ | 243 |
| $3\frac{1}{2}$ | 299 |
| $3\frac{1}{4}$ | 373 |
| 3 | 474 |
| $2\frac{3}{4}$ | 615 |
| $2\frac{1}{2}$ | 819 |
| $2\frac{1}{4}$ | 1124 |
| 2 | 1600 |

| Navigation, description of the barges, etc, | Authority. | Whole load including barge. | Moving force. | No. of lbs. drawn by 1 lb. | Rate in miles per hour | Computed rate when 1lb draws 180 lbs. | Computed rate when 1lb draws 200 lbs. | REMARKS. |
|---|---|---|---|---|---|---|---|---|
| | | Tons. | lbs. | | | | | |
| Ellesmere boats, half the usual breadth; length 69 feet; breadth 3 feet 6 inches. | Palmer. | 14½ | 168 | 193 | 4.60 | 4.70 | 4.54 | |
| | | 14½ | 170 | 191 | 4.69 | 4.78 | 4.62 | |
| | | 15 | 77 | 436 | 3.63 | 4.97 | 4.70 | |
| | | 15 | 50 | 672 | 2.96 | 4.59 | 4.43 | |
| Common boat. | Do. | 30 | 50 | 1344 | 1.90 | 3.71 | 3·58 | |
| Common boat, half load. | Do. | 19¾ | 79 | 500 | 2.94 | 4.29 | 4.12 | The moving weights were 66 lbs. and 91 lbs; they are corrected for the effect of the wind. |
| | | 19¾ | 78 | 567 | 2.80 | 4.10 | 3.96 | |
| Common boat, full load. | Do. | 29¾ | 98 | 680 | 2.73 | 4.25 | 4.09 | |
| | | 29¾ | 175 | 381 | 3.27 | 4.19 | 4.05 | |
| Two common boats, end to end. | Do. | 39 | 164 | 532 | 2.80 | 4.01 | 3.87 | |
| | | 39 | 172 | 507 | 2.58 | 3.64 | 3.51 | |
| Do full load. | Do. | 60 | 196 | 689 | 2.50 | 3·91 | 3.75 | |
| Common boat. | Bevan. | 31 | 80 | 863 | 2.45 | 4.13 | 4.08 | |
| Common boat, full load. | Barlow, Donkin, &c. | 27 | 308 | 203 | 3.87 | 4.02 | 3.88 | |
| | | 27 | 77 | 814 | 2.44 | 4.04 | 3.90 | |
| | | | | | Mean | 4.22 | 4.06 | |

From the American Journal of Science and Arts, for April, 1837.

## NOTICE OF THE ELECTRO-MAGNETIC MACHINE OF MR. THOMAS DAVENPORT, OF BRANDON, NEAR RUTLAND VERMONT.

Many years have passed since motion was first produced by galvanic power. The dry columns of De Luc and Zamboni caused the vibration of delicate pendulums and the ringing of small bells, for long periods of time, even several years without intermission.

In 1819–20, Prof. Oersted, of Copenhagen, discovered, that magnetism was evolved between the poles of a galvanic battery. Prof. Sweigger, of Halle, Germany, by his galvanic multiplier, succeeded in rendering the power manifest, when the galvanic battery was nothing more than two small wires, one of copper and the other of zinc, immersed in as much acidulated water as was contained in a wine glass. The power thus evolved was made to pass through many convolutions of insulated wire, and was thus augmented so as to deflect the magnetic needle sometimes even 90°. Prof. Moll, of Utretcht, by winding insulated wire around soft iron, imparted to it prodigious magnetic power, so that a horse shoe bar, thus provided, and connected with a galvanic battery, would lift over one hundred pounds. About the same time, Mr. Joseph Henry, of Albany, now Prof. Henry, of Princeton College, by a new method of winding the wire, obtained an almost incredible magnetic force, lifting six or seven hundred pounds, with a pint or two of liquid and a battery of corresponding size; nor did he desist, until, a short time after, he lifted thousands of pounds, by a battery of larger size, but still very small, (1830.)

This gentleman was not slow to apply his skill to the generation of motion, and a successful attempt of his is recorded in this Journal, Vol. xx. p. 340. A power was thus applied to the movement of a machine, by a beam suspended in the centre, which performed regular vibrations in the manner of a beam of a steam-engine. This is the original application from which have sprung, or at least to which have succeeded, several similar attempts, both in this country and in Europe. A galvanic machine was reported to the British Association in 1835, by Mr. McGauly, of Ireland, and he has renewed his statements of successful experiments at the late meeting at Bristol. Mr. Sturgeon, of Woolwich, England, also reports a galvanic machine as being in use on his premises for pumping water, and for other mechanical purposes.*

But, I believe that Mr. Davenport, named at the head of this notice, has been more successful than any other person in the discovery† of a galvanic machine of great simplicity and efficiency. During the last two or three years, much has been said of this discovery in the newspapers, and it is probable, that in a future number of this Journal, drawings, and an accurate description of the machine may be given. Having been recently invited to examine a working model, in two varieties of form, and to report the result, I shall now attempt nothing more than a general description, such as may render intelligible the account I am to give.

1. *The Rotary Machine, composed of revolving electro-magnets, with fixed permanent magnets.*

This machine was brought to New-Haven March 16, 1837, by Mr. Israel Slade, of Troy, N. Y., and by him set in motion for my examination. The moving part is composed of two iron bars placed horizontally, and crossing each other at right angles. They are both five and a half inches long, and they are terminated at each end by a segment of a circle made of soft iron; these segments are each three incher long in the chord line, and their position, as they are suspended upon the ends of the iron bars, is horizontal.

The iron cross is sustained by a vertical axis, standing with its pivot in a socket, and admitting of easy rotation. The iron cross bars are wound with copper wire, covered by cotton, and they are made to form, at pleasure, a proper connexion with a small circular battery, made of concentric cylinders of copper and zinc, which can be immersed in a quart of acidulated water. Two semicircles of strongly magnetized steel form an entire circle, interrupted only at the two opposite poles, and within this circle, which lies horizontally, the galvanized iron cross moves in such a manner that its iron segments revolve parallel and very near to the magnetic circle, and in the same plane. Its axis at its upper end, is fitted by a horizontal cog-wheel to another and larger vertical wheel, to whose horizontal axis, weight is attached and raised by the winding of a rope. As soon as the small battery, destined to generate the power, is properly connected with the machine, and duly excited by diluted acid, the motion begins, by the horizontal movement of the iron cross, with its circular segments of flangers. By the galvanic connection, these crosses and their connected segments are magnetized, acquiring north and south polarity at their opposite ends, and being thus subjected to the attracting and repelling force of the circular fixed magnets, a rapid horizontal movement is produced, at the rate of two hundred to three hundred revolutions in a minute, when the small battery was used, and over six hundred with a calorimotor of large size. The rope was wound up with a weight of fourteen pounds attached, and twenty-eight pounds were lifted from the floor. The movement is instantly stopped by breaking the connexion with the battery, and then reversed by simply interchanging the connexion of the wires of the battery with those of the machine, when it becomes equally rapid in the opposite direction.

The machine, as a philosophical instrument, operates with beautiful and surprising effect, and no reason can be discovered why the motion may not be indefinitely continued. It is easy to cause a very gradual flow of the impaired or exhausted acid liquid from, and of fresh acidulated water into, the receptacle of the battery, and whenever the metal of the latter is too much corroded to be any longer efficient, another battery may be instantly substituted, and that even before the connexion of the old battery is broken. As to the energy of the power, it becomes at once a most interesting inquiry, whether it admits of indefinite increase? To this inquiry it may be replied, that provided the magnetism of both the revolving cross and of the fixed circle can be indefinitely increased, then no reason appears why the energy of the power cannot also be indefinitely increased. Now, as magnets of the common kind, usually called permanent magnets, find their limits within, at most, the power of lifting a few hundred pounds, it is obvious

* Sturgeon's Annals of Electricity, Magnetism, &c. No. 1. Vol. 1. October, 1836.

† Mr. Davenport appears to have been strictly the inventor of a method of applying galvanism to produce rotary motion.

that the revolving galvanic magnet must, in its efficiency, be limited, by its relation to the fixed magnet. But it is an important fact, discovered by experience, that the latter is soon impaired in its power by the influence of the revolving galvanic magnet, which is easily made to surpass it in energy, and thus, as it were, to overpower it. It is obvious, therefore, that the fixed magnet, as well as the revolving, ought to be magnetized by galvanism, and then there is every reason to believe that the relative equality of the two, and of course their relative energy, may be permanently supported, and even carried to an extent much greater than has been hitherto attained.

2. *Rotating Machine, composed entirely of electro-magnets, both in its fixed and revolving members.*

A machine of this construction has been, this day, March 29, 1837, exhibited to me by Mr. Thomas Davenport himself, who came from New-York to New-Haven for that purpose.

It is the same machine that has been already described, except that the exterior fixed circle is now composed entirely of electro-magnets.

The entire apparatus is therefore constructed of soft unmagnetic iron, which being properly wound with insulated copper wire, is magnetized in an instant, by the power of a very small battery.

The machine is indeed the identical one used before, except that the exterior circle of permanent magnets is removed and in its place is arranged a circle of soft iron, divided into two portions to form the poles.

These semicircles are made of hoop iron, one inch in width, and one-eighth of an inch in thickness. They are wound with copper wire insulated by cotton—covering about ten inches in length on each semicircle and returning upon itself, by a double winding, so as to form two layers of wire, making on both semicircles about one thousand five hundred inches.

The iron was not wound over the entire length, of one of the steel semicircles; but both ends were left projecting, and being turned inward, were made to conform to the bend of the other part, as in the annexed figure, which is intended to represent one of

them; each end that is turned inward and not wound is about one-third of the length of the semicircle. These semicircles being thus fitted up, so as to become, at pleasure, galvanic magnets, were placed in the same machine that has been already described, and occupied the same place that the permanent steel magnets did before. The conducting wires were so arranged, that the same current that charged the magnets of the motive wheel, charged the stationary ones, placed around it, only one battery being used. It should be observed, that the stationary galvanic magnets thus substituted for the permanent steel ones, were only about half the weight of the steel magnets. This modification of the galvanic magnet, is not of course the best form for efficiency; this was used merely to try the principle, and this construction may be superseded by a different and more efficient one. But with this arrangement, and notwithstanding the imperfection of the mechanism of the machine—when the battery, requiring about one quart of diluted acid to immerse it, was attached, it lifted 16 lbs., very rapidly, and when the weight was removed, it performed more than 600 evolutions per minute.

So sensible was the machine to the magnetic power, that the immersion of the battery one inch into the acidulated water, was sufficient to give it rapid motion, which attained its maximum, when the battery was entirely immersed. It appeared to me that the machine had more energy with the electro-magnets, than with those that were permanent, for with the smallest battery, whose diameter was three inches and a half; its height five inches and a half, and the number of concentric cylinders three of copper and three of zinc, the instrument manifested as great power as it had done with the largest batteries, and even with a large calorimotor, when it was used with a permanent instead of a galvanic magnet. With the small battery and with none but electro or galvanic magnets, it revolved with so much energy as to produce a brisk breeze, and powerfully to shake a large table on which the apparatus stood.

Although the magnetization of both the stationary and revolving magnets was imparted by one and the same battery, the magnetic power was not immediately destroyed by breaking the connexion between the battery and the stationary magnet; for, when this was done, the machine still performed its revolutions with great, although diminished energy; in practice this might be important, as it would give time to make changes in the apparatus, without stopping the movement of the machine.

It has been stated by Dr. Ritchie, in a late number* of the London and Edinb. Phil. Magazine, that electro-magnets do not attract at so great a distance as permanent ones, and therefore are not well adapted for producing motion. On this point Mr. Davenport made the following experiment, of which I was not a witness, but to which I give full credit, as it was reported to me by Mr. Slade, in a letter dated New-York, March 24, 1837.

Mr. Davenport suspended a piece of soft iron with a long piece of twine and brought one pole of a highly charged steel magnet within the attracting distance, that is, the distance at which the iron was attracted to the magnet; by measurement, it was found that the steel magnet attracted the iron one inch and one-fourth. A galvanic magnet was next used of the same lifting power, and consequently of much less weight; the attracting distance of this magnet was found to be one inch and three-fourths, showing a material gain in favor of the galvanic magnet.—Mr. Slade inquires, "has Mr. Ritchie's magnet been so constructed as to give a favorable trial to this principle?"* Mr. Davenport informs me that each increase in the number of wires has been attended with an increase of power.

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* January, 1837.

*Conclusions.*

1. It appears then, from the facts stated above, that electro-magnetism is quite adequate to the generation of rotary motion.

2. That it is not necessary to employ permanent magnets in any part of the construction, and that electro-magnets are far preferable, not only for the moving but for the stationary parts of the machine.

3. That the power generated by electro-magnetism may be indefinitely prolonged, since, for exhausted acids, and corroded metals, fresh acids and batteries, kept always in readiness, may be substituted, even without stopping the movement.

4. That the power may be increased beyond any limit hitherto attained, and probably beyond any which can be *with certainty* assigned,—since, by increasing all the members of the apparatus, due reference being had to the relative proportionate weight, size, and form of the fixed and moveable parts—to the length of the insulated wires and the manner of winding them—and to the proper size and construction of the battery, as well as to the nature and strength of the acid or other exciting agent, and the manner of connecting the battery with the machine, it would appear certain, that the power must be increased in some ratio which experience must ascertain.

5. As electro-magnetism has been experimentally proved to be sufficient to raise and sustain several thousands of pounds, no reason can be discovered why, when the acting surfaces are, by skillful mechanism, brought as near as possible, without contact, the continued exertion of the power should not generate a continued rotary movement, of a degree of energy inferior indeed to that exerted in actual contact, but still nearly approximating to it.

6. As the power can be generated cheaply and certainly—as it can be continued indefinitely, as it has been very greatly increased by very simple means—as we have no knowledge of its limit, and may therefore presume on an indefinite augmentation of its energy, it is much to be desired, that the investigation should be prosecuted with zeal, *aided by correct scientific knowledge*, by *mechanical skill*, and by *ample funds*. It may therefore be reasonably hoped, that science and art, the handmaids of discovery, will both receive from this interesting research, a liberal reward.

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Science has thus, most unexpectedly, placed in our hands a new power of great but unknown energy.

It does not evoke the winds from their caverns; nor give wings to water by the urgency of heat; nor drive to exhaustion the muscular power of animals; nor operate by complicated mechanism; nor accumulate hydraulic force by damming the vexed torrents; nor summon any other form of gravitating force; but, by the simplest means—the mere contact of metallic surfaces of small extent, with feeble chemical agents, a power every where diffused through nature, but generally concealed from our senses, is mysteriously evolved, and by circulation in

* This question I am not able to answer, as I have not seen any account of the apparatus or of the experiment, but only of the result.

insulated wires, it is still more mysteriously augmented, a thousand and a thousand fold, until it breaks forth with incredible energy: there is no appreciable interval between its first evolution and its full maturity, and the infant starts up a giant.

Nothing since the discovery of gravitation and of the structure of the celestial systems, is so wonderful as the power evolved by galvanism; whether we contemplate it in the muscular convulsions of animals, the chemical decompositions, the solar brightness of the galvanic light, the dissipating consuming heat, and, more than all, in the magnetic energy, which leaves far behind all previous artificial accumulations of this power, and reveals, as there is full reason to believe, the grand secret of terrestrial magnetism itself.

B. S.

New-Haven, March 31, 1837.

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*Claim of Thomas Davenport.*

In the words of the patent, taken out, this invention "consists in applying magnetic and electro-magnetic power as a moving principle for machinery, in the manner described, or in any other substantially the same in principle."

"Mr. Davenport first saw a galvanic magnet in December, 1833, and from the wonderful effects produced by suspending a magnet of 150 lbs. from a small galvanic battery, he immediately inferred, without any knowledge of the theory or the experiments of others, that he could propel machinery by galvanic magnetism. He purchased the magnet and produced his first rotary motion in July, 1834. In July, 1835, he submitted his machine to Prof. Henry, of Princeton, New-Jersey, also without any knowledge of Prof. Henry's experiments in producing a vibratory motion. From this gentleman he received a certificate, testifying to the originality and importance of the invention."

Mr. Davenport is, by occupation, a blacksmith, with only a common education, but with uncommon intelligence; his age about thirty-five. Mr. Ransom Cook, of Saratoga Springs, is associated with Mr. Davenport, and has rendered essential service by the improvements he has made in the machine, and by his assistance in bringing the subject before the public in the most effectual way. Arrangements have been made to take out the patent in Europe.

P. S. The proprietors are constructing a machine of seven inches in diameter, and also one of two feet in diameter. Galvanic magnets will be used as the moving and stationary magnets of each.

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ON THE PROCESS OF CARBONIZATION, OR MANUFACTURE OF CHARCOAL, AT GOERSDORF, IN SAXONY.

It having been suggested by M. Boult that a superior charcoal might be produced by filling the interstices of the pile with small charcoal, the refuse of former burnings, an experiment was made, which, after being several times repeated, gave the following results: 1st, an increase of produce, amounting to not less than four per cent. above that yielded by the ordinary process; 2nd, a much smaller quantity of dust and small coal, 3rd, scarcely any smoke; 4th, charcoal of a very equal and superior quality.

A pile prepared for carbonization at Goersdorf contained in general about thirty *schragen*, (318 cubic yards) of pine trees split in quarters, which yielded, including the small coal, from eighty-nine to ninty-two per cent. in bulk of charcoal. It was considered desirable to ascertain, whether by increasing the size of the pile, a more considerable product would be obtained.—A pile containing forty-nine schragen (520 cubic yards,) of cleft pine wood, gave in an experiment, during which the weather proved favorable, 89.94 per cent. of charcoal (including the small,) very sonorous, and of very good quality. A second trial of 69½ schragen (740 cubic yards,) of similar wood produced only 87.98 per cent. but the weather in this instance was unfavorable.

This experiment was repeated with seventy-one schragen (750 cubic yards,) the weather continuing fine throughout the process; the produce amounted to 94.87 per cent.; equal in quality to the former results. The average results of the adoption of this process at Goersdorf, will appear from the following table of the produce, from the commencement to the date of the latest improvements.

| | Produce per cent. | | Total produce per cent. |
|---|---|---|---|
| | Large. | Small. | |
| 1821. . . | 74.34 | 3.91 | 78.85 |
| 1822. . . | 76 24 | 4.76 | 81.— |
| 1823. . . | 76.44 | 5.25 | 81.69 |
| 1824. . . | 77.95 | 4.09 | 82.04 |
| 1825. . . | 86.31 | 4.35 | 90.66 |
| 1826. . . | 86.31 | 3·62 | 89.93 |
| 1827. . . | 87.53 | 4.20 | 91.73 |

The increase observable in the produce of 1825, is to be attributed, principally to the care with which the operations were conducted, but it must be also remarked, that the removal of the pipe for collecting the acid formed in the process of carbonisation, may also have contributed beneficially to the results. M. Karsten in his *Voyage Metallurgique* states, that in Carinthia, the carbonization of pine wood is performed in large stacks, containing 20,000 cubic feet, and without the trees being previously split, yet the produce in bulk is computed at from seventy-one to eighty-six per cent. It is obvious, that there exists no analogy between these results and those obtained from the brushwood and billets of oak, beach, &c., by the common process of carbonization, which seldom yields more than from thirty-five to forty-five per cent.; it is, therefore, only necessary to call public attention to the fact, and it may naturally be expected that, in the present state of practical science, a subject of so much importance in metallurgy will be duly investigated.—[Lond. Quar. Mining Review.]

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CONSUMPTION OF COAL IN GREAT BRITAIN.—The quantity of iron annually produced in Great Britain may be taken at 700,000 tons; and the quantity of coal required, at an average, to produce each ton of iron, including that used by engines, &c. may be estimated at 5½ tons; giving a total of 3,850,000 tons consumed in the making of iron. According to Mr. Kennedy, the quantity of coal consumed in the cotton manufacture, in 1817, was upwards of 500,000 tons, and the manufacture has since more than doubled; so that, allowing for greater economy, we may fairly estimate the consumption of coal in the cotton trade at 800,000 tons a year. Its consumption in the woollen, linen, and silk trades cannot be less than 500,000 tons. The smelting of the copper ores of Cornwall consume annually about 250,000 or 300,000 tons; and it is supposed that the brass and copper manufactures require nearly as much. In the salt-works of Cheshire, Worcestershire, &c. the consumption is probably not under, if it do not exceed, 300,000 tons. The consumption in lime works may, it is believed, be estimated at 500,000 tons. It would appear, therefore, that the total annual consumption of coal in Great Britain may be moderately estimated as follows:—

| | Tons. |
|---|---|
| Domestic consumption, and smaller manufactures | 15,000,000 |
| Production of pig and bar iron | 3,850,000 |
| Cotton manufacture | 800,000 |
| Woollen, linen, silk, &c. | 500,000 |
| Copper smelting, brass manufactures, &c. | 450,000 |
| Salt-works | 300,000 |
| Lime-works | 500,000 |
| | 21,350,000 |
| Exports to Ireland | 750,000 |
| Ditto to colonies and foreign parts | 600,000 |
| Total | 22.700,000 |

If we suppose that the above sum of 22,700,000 tons costs the consumer, on an average, 7*s.* a ton, it will be worth, in all, 7,955,000*l.* a year!—[M'Culloch's Account of the British Empire.]

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From the Journal of the Franklin Institute.

A MODE OF ANALYSING GERMAN SILVER.

BY JAS. C. BOOTH.

As the employment of this interesting compound is daily becoming more general, it becomes a point of some importance to the manufacturer to ascertain with some accuracy the composition of those kinds in the market, which are adjudged to possess superior qualities. For this purpose I have contrived a method of analysing them, which may be successfully practised by any one who possesses a little chemical knowledge. A small piece of about 20 grains is dissolved in nitro-muriatic acid with the assistance of a gentle heat, by which means the metals will be converted into chlorides. If the solution be filtered through a small paper-filter, and a white powder remain after washing with water, it is the chloride of silver, the presence of which metal in the compound is accidental and scarcely appreciable. The acidulated solution is then treated by sulphuretted hydrogen, which separates copper and a little arsenic. The sulphuret of copper is collected on a filter, treated with nitric acid in a gentle

heat, till the sulphur appears whitish, then filtered, brought to boiling, precipitated with caustic potassa, filtered and weighed. 100 parts of this precipitate contains 79.83 of metallic copper. To the solution after filtering off the sulphuret of copper, a little nitric acid is added, and the whole heated in order to convert the protroxide into the peroxide of iron. Muriate of Ammonia is then added to the same and a small excess of ammonia, which precipitates only the peroxide of iron. This may be collected on a filter and weighed, 100 parts of it contain 69.34 of metallic iron. The solution is now to be treated with carbonate of soda and evaporated to dryness; the dry mass is treated with hot water, and the residue washed and dried. This powder, consisting of carbonic of zinc and nickel, is mixed with half its weight of saltpetre and ignited until the whole is nearly dry. It is transferred to a filter after being powdered in a small mortar, and is then washed two or three times with pure, but dilute, nitric acid, which dissolves the oxide of zinc, and leaves the *peroxide* of nickel. To the zinc solution carbonate of soda is added, the whole evaporated to dryness, treated with hot water, and the remainder after being dried and ignited is weighed, 100 parts contain 80.13 metallic zinc. The peroxide of nickel is dissolved in hydro-chloric acid, precipitated by caustic potassa, filtered off and weighed, 100 parts of it contain 78.71 metallic nickel.

The separation of nickel and zinc is ever attended with difficulty and some uncertainty, but it is rendered much more simple by the method which I propose, and which is not more inaccurate than others in use. Before weighing any of the above oxides, it is decidedly preferable to burn the filter after shaking off as much of the substance as possible into a platinum crucible, to add the ashes, and then substract their weight from that of the oxide.

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THE FIRST RUSSIAN RAILWAY.—The locomotive carriages made in England for the Pawlosk Railways, do not appear to have answered *quite* so well at the place of their destination, as they are said to have done on experimental trips in the land of their birth. On the 22nd December last, some short journeys were performed on that part of the line already completed, for the express purpose of demonstrating the practicability of Railway travelling in the very depth of a Russian winter. On this occasion, the velocity did not much exceed twenty miles an hour: a very satisfactory pace, especially under the circumstances, but still something under the "seventy-five miles an hour" rate *reported* to have been attained in England: on another day, the result was not even equal to this, which is attributed to the wind's blowing against the line of direction; perhaps, therefore, it blew the right way on the experimental trips, under the direction of the builder. On the 22nd December, the apparatus for removing the snow from before the wheels was tried, and proved quite successful; from recent experience at home, it would appear that any apparatus for that special purpose is quite unnecessary.

## Agriculture, &c.

### IMPROVING FRUIT TREES.

Among the illustrious benefactors of mankind, the name of Van Mons* seems destined to hold a conspicuous place. By almost incredible labor, perseverance, and constancy of purpose, through a long succession of years, he seems to have established a philosophical theory of improving or ameliorating fruit trees and other productions of nature, worthy of a place by the side of the wonderful discoveries and improvements in other branches of philosophy which characterize the age of Herschel, Sir Humphrey Davy, Cuvier, and a host of other distinguished contemporaries,—

"Whose names must honored live, till science dies."

From a long article in the Horticultural Register and Gardener's Magazine of June, 1836,—communicated by Hon. H. A. S. Dearborn,—we have compiled the following, which we think cannot fail of being interesting to a large portion of the members of the Essex Agricultural Society. A. N.

### VAN MON'S THEORY OF AMELIORATING OR IMPROVING FRUIT TREES, BY RAISING SUCCESSIVE GENERATIONS FROM SEED.

So long as plants or trees remain in their natural situation, their seed always produce the same; but on changing their climate and territory some will vary more or less, and when they have once departed from their natural state, they never again return to it, but are removed more and more by successive generations.

The seed, for example, of the wild pear trees, in their native region, always reproduce their like at every age; that is, be the tree twenty or a thousand years old at the time the seed is taken from it, the fruit of its offspring trees will be precisely like that of the parent stock. But the seed of a domesticated pear tree, that is, a tree which produces better, or at least a different kind of fruit from its wild ancestors, produces trees not only very different from itself and them, but this difference will be greater if the seed be taken from the young seedling's first or early fructification, than it will be if taken from the same tree after it has been many years in bearing.

To improve or ameliorate fruit trees, therefore, as expeditiously as possible, young seedlings should be forced into bearing as early as may be, and the seed first produced planted. Pursuing this method, Van Mons, notwithstanding the seed that he was obliged to use in his first experiments were obtained from ancient varieties, whose age, although uncertain, was much advanced, was enabled to reach, in forty two years, the fruit of the fifth generation of his pear trees, all of which was good and excellent. His first generation yielded their first fruit in from twelve to fifteen years, his second in from ten to twelve years, his third in from eight to ten years, his fourth in from six to eight years, and his fifth in six years, and in the eighth generation he obtained a few pear trees which fructified at the age of four years. He also found that three or four generations without interruption, from parent to son, and from twelve to fifteen consecutive years, were sufficient to obtain no other than excellent fruit from the stones of peaches, apricots, plums and cherries;—that to obtain none other than good apples, only four generations, and about twenty years, were required.

Such, briefly, according to Van Mons, is the philosophy of improving fruit trees.—But why, it may be asked, if fruit trees are capable of such rapid improvement, by reproduction from seed, do so few seedling trees among us produce good fruit? From the theory of Van Mons may be obtained a philosophic answer to this inquiry. Trees, like all other organized beings, have limited periods of youthful growth, maturity, and decay. Trees propagated by cuttings, scions, &c., are only the multiplication of individuals, and subject to the same great law of nature. Their age, however late they may have commenced an independent existence, must be considered the same as that of the parent stock, and when the full period of the natural life of the original tree shall have been completed, will cease to exist. Age alone, according to Van Mons, causes our fruit trees to deteriorate, and their seeds to degenerate. Seed, he says, which are yielded by the hundredth fructification of a domesticated pear of excellent quality, produce a great variety of trees, whose fruits, almost always detestable, are more or less near to a wild state. Seedling trees, with us, have generally been the offspring of old varieties; hence they have seldom produced good fruit. Whoever, therefore, may possess young seedlings which produced good fruit, would confer a great favor on the community by preserving the seed for planting. It has been ascertained that it is advantageous to collect the fruit a little before it is ripe, and leave it to become perfectly mellow and reach a state of decay, before extracting the seeds or stones for planting. The apple is said to deteriorate less rapidly, and to live longer than the pear.

The subject of deterioration naturally leads us to inquire how many years a variety of pear may live. Van Mons estimates that it may live from two to three hundred years. But I have remarked, he says, that the most excellent, beyond all others, least resist the ravages of old age. They cannot attain the age of half a century, without manifesting symptoms of decrepitude. The first of these symptoms is that of bearing less constantly and the fruit ripening later. The decay of the wood, and the loss of the beautiful form of the tree, and the alteration of the fruit, follow at much later periods. The varieties that have existed but half a century, do not suffer from canker at the ends of the branches, nor from diseases of the bark; the fruit does not crack, nor is it filled with a hard substance, covered with knots, nor insipid or dry.—These varieties can still be grafted on other trees, without their infirmities being augmented. It requires half a century more to render them worthless. It is painful to think that soon the St. Germain, the Beurre Gris, the Crassanne, the Colmar, and the

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* Professor of Chemistry at the University of Louvain, Belgium.

St. Michæls, must submit to this destruction. None of these varieties succeed any longer in Belgium, except when engrafted on a thorn, and as espaliers, trained against a wall; but this success is at the expense of their commendable qualities.

Van Mons does not attribute the deterioration of fruit trees to their multiplication by repeated engrafting, but contends that natural and grafted trees deteriorate in the same manner and with the same rapidity, in consequence merely of their age. He discovered in an old garden of the Capuchines, the parent tree of the Bergamote de la Pentacote, an old pear. All the trees grafted from it are affected with canker, in slightly moist land, and the fruit is small, cracks when growing in the open air, is covered with black spots, which communicate a bitter taste, and no longer succeeds, but when trained as an espalier along a wall. The parent tree was infected with all the evils found in those grafted from the same variety. He took suckers from the roots and scions at the same time, which he grafted on other stocks, and the trees produced by both were deteriorated in the same degree and manner as those which have been for a long time multiplied by the graft. Poiteau, the admirer and panegyrist of Van Mons, thinks, however, that this rapid deterioration of fruit trees may be somewhat delayed if scions be always taken from the most healthy individuals and inserted only into vigorous stocks.

Van Mon's method of raising fruit trees from the seed was as follows. He left the plants in the seed bed two years; he then took them up, preserved and transplanted only the most vigorous, at such a distance one from the other that they could thoroughly develope themselves and fructify. He planted them about ten feet apart, sufficiently near to force them to run up tall and form pyramidal tops, which he states hastens their fructification. While waiting for his trees to produce fruit, he studied their form and physiognomy, and from long continued observations established the following prognostics of what they may become, from their different exterior characteristics.

1. *Prognostics of a favorable augury* — A good form, a smooth and slightly shining bark, a regular distribution of the branches in proportion to the height of the tree; annual shoots bent, striated, a little twisted, and breaking clear without splinters, thorns long and garnished with eyes or buds nearly their whole length; eyes or buds plump, not divergent red or grizzled; leaves smooth, of a mean size, crimped on the side of the middle nerve, borne on petioles (the stem of the leaf) rather long than short, the youngest in the spring remaining a long time directly against the bud, the others expanded, hollowed into a gutter from the bottom towards the top, but not their whole length.

2. *Bad prognostics.*—Branches and twigs confused, protruding like those of the hornbeam, thorns short without eyes; leaves averted from the bud, from their first appearing small round, terminating in a short point, guttered their whole length. These characteristics indicate small fruit, sweet, dry and late, fit only for baking.

3. *Prognostics of early fruit.*—Wood large, short; buds large and near,

4. *Prognostics of late fruit.*—Wood slim, branches well distributed, pendant, the shoots a little knotted, generally denote late delicious fruit; with leaves round, point short, stiff, of a deep green, borne on petioles of mean length, are analogous signs, but less sure.

Van Mons remarks, that among the new pears which he has obtained, there are some which were several years in taking a fixed form; that several did not assume one for from twelve to fifteen years, and that others never did. Our old varieties, without doubt, have been in the same situation, and he gives as an example of pears that have never assumed a determinate form, our Bon Cretien de Hiver. Still it is most easily recognized, notwithstanding the variation in its form and size.

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### TRANSACTIONS OF THE ESSEX AGRICULTURAL SOCIETY, MASS.

The Annual account of the "Transactions of the Essex Agricultural Society in Massachusetts" has just been published. It is a valuable document; and does honor to this society, which stands unsurpassed in the country for its spirited exertions in the cause of our improved husbandry; and for the zeal, ability, and intelligence with which its operations have been conducted. We have already laid before the readers of the New-York Farmer the sensible address of Nath'l. W. Hazen, Esq., which forms the first article in these Transactions.—This is followed by some remarks from Governor Everet on the same occasion, which are particularly entitled to attention; and which, though they contain some local allusions, we are happy in laying before our readers. Like every thing of the kind which proceeds from that distinguished gentleman, of whose talents, knowledge, eloquence, public spirit, and usefulness the Commonwealth has just reason to be proud, they are to the point; they are feeling, instructive, and patriotic; and the local allusions give them an increased interest.

### REPORT—COMMITTEE OF ARRANGEMENTS.

When the discourse of Mr. Hazen was concluded, Dr. Nichols, of Danvers, addressed the Governor and audience through the following Report:—

The Committee of Arrangements ask leave to report:—That they have had the satisfaction of seeing their plans and provisions for the day carried into execution without loss of time, and in a manner equal to their expectations. As a whole, the exhibition has perhaps been inferior to some of the Shows in former years. This they are willing to attribute to the unfavorable season and the inclement weather of the morning, rather than to a want of interest in the Agricultural community in the objects of the Society. The utility of this Association they are happy to believe depends not so much on the cattle and things exhibited at their Shows, as on the opportunities these afford the Farmers of the County, to become acquainted with each other, for consultations on subjects peculiarly interesting to themselves, and for offering up their united adorations to Him who giveth seed time and harvest, and who alone can crown the labors of the husbandman with success.

This day has also been rendered unusually interesting by the presence of His Excellency the Governor of the Commonwealth. In extending to your Excellency an invitation to attend on this occasion, the Committee believe it to be peculiarly proper that an exhibition attained mainly by the bounty of the State should come under the supervision of its Chief Magistrate; and they felt confident that one so distinguished for performing with the strictest fidelity all the duties and proprietics of his exalted station, would be pleased to embrace the opportunity afforded him, to countenance and encourage one of the great interests of the Commonwealth by showing himself personally interested in the success of its Agricultural Societies, and by manifesting a disposition to become acquainted with the wants of the industrious yeomanry of which they are composed. And your presence here,—for which the Committee in behalf of the Society tender you their hearty thanks,—assures them that they have not mistaken your views or feelings in these particulars.

Per order of the Committee.

ANDREW NICHOLS.

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### REMARKS OF GOV. EVERETT.

After the Report of the Committee of Arrangements had been read, Governor EVERETT rose and made his acknowledgments to the Committee for the manner in which they had alluded to the circumstance of his being present. He expressed his gratification at the exhibition of the day, and his confidence that the bounty of the State was beneficially applied by the Essex Agricultural Society. He stated that the wish had been expressed that he should address the audience. He felt that in complying with the request he stepped beyond the line of usage on such occasions, but he trusted the responsibility of his doing so would be considered as resting with the Committee, by whom the wish had been expressed.

The Governor added that he felt additional embarrassment in following the orator, who, in his very able and interesting discourse, had anticipated many of the general remarks appropriate to such an occasion. His only effort could now be, to subjoin a few observations, so simple as to present themselves without research, and he hoped important enough to bear a repetition, should it happen, as was very probable, that they had been already made by the orator of the day.

After some remarks on the nature and objects of cattle shows, and their beneficial influence on the state of the husbandry of this part of the country, Governor Everett proceeded substantially as follows:

The benefit, which has accrued to our farmers from these exhibitions, cannot be estimated in dollars or cents, or measured by the figures employed to state an increase of agricultural products. A few more tons of hay from your meadows; a few more bushels of corn or potatoes from your tilled

lands; a better stock of animals for the dairy, the fold, or the pen, would add something, it is true, to the public and private wealth of the community; but if nothing farther came of it, it would be a matter in which neither the patriot nor the christian could take a deep interest.

But when we consider, that the *class of husbandmen* is numerically *the largest* in the community; and that on their condition it has been found, in the experience of the whole world, that the social, political, and moral character of countries mainly depends, it follows as self-evident, that whatever improves the situation of the farmer feeds the life-springs of the national character. In proportion as our husbandmen prosper, they not only enjoy themselves a larger portion of the blessings of life; but society is kept in a healthy state, and they are enabled to make ampler provision for the education and establishment of their children, and thus leave behind them a posterity competent not only to preserve and assert, but to augment their heritage.

It will accordingly be found, that the great differences in the political condition of different countries coincide directly with the different tenure on which the land is held and cultivated. It is not that in one country the Government is administered by an elective President; in another by a limited monarchy; in another by an absolute despot. These things are not unimportant; because forms have a tendency to draw the substance after them. But a far more important question, in deciding the political condition of different countries is, *how is the land held?* The orator has told us what is the case in many parts of Europe but there are countries where the case is still worse. There are countries where the land, the whole of it, is claimed to be the property of an absolute despot,—rather a chief of brigands than a sovereign,—who once or twice a year sends out his armed hordes to scour the territory, to sweep together, without the shadow of law or pretence of right, whatever they can lay their hands on; leaving the wretched peasant little else than what he actually grasps with his teeth. Such is the system introduced into some parts of Hindostan, by their Mahometan conquerors, and it has had the effect of breaking down the civilization of countries once refined, learned, wealthy and prosperous, into a condition very little better than that of the North American savage. Contrast this with the system on which our lands are held and occupied, in pursuance of which as a general rule, it is *divided into small farms*, the property of those who till them, who have every inducement and facility to better their condition, and who feel themselves on an equality with their fellow citizens in every other pursuit. It is plain that over such a population no government could exist but one like that beneath which we live, in which the people are the direct source of power. Where this is the case, it is equally plain that whatever improves and raises the condition of husbandmen, tends directly to sustain and fortify the social fabric.

A very celebrated ancient poet exclaimed, "Oh, two happy farmers! did you but know your blessings" If this could be said of the farmers of Italy, at the close of the civil wars, subjects of an absolute prince, and a part of them only the owners of the land they tilled, it may well be repeated of the husbandmen of New-England, the proprietors of a soil, which furnishes a competence of all the good things of life, and the possessors of an *amount of blessings never surpassed*, if ever equalled. Not among the least of these privileges, is the rich birthright of patriotic recollections which has come down to us from our fathers, and of which no portion of the country has more to boast than the ancient county of Essex. It is no mere compliment, sir;—the county of Essex is a distinguished part of the State. It would be easy, within the limits of this single county, to find, in the history of other times, bright examples of all the traits of character and conduct which promote the prosperity and honor of nations, in peace and war. From the early contest with the Indians and French; from the time when the "Flower of Essex" fell at "Bloody Brook," down to the close of the revolution, the fathers and forefathers of those I have the honor to address, contributed a full share of the counsel and treasure, the valor and blood by which the cause of the country was directed, sustained, and carried through triumphant. Need I go beyond the limits of the town of Danvers? Is it not enough to recall the time, not beyond the memory I am sure of some whom I see before me, when a regiment of royal troops was here encamped, a sort of prætorian band to guard the residence of the royal Governor?—Need I do more than remind you of the morning of the 19th of April, 1775, when your sires, at the sound of the bell of yonder church, hastened together, a portion of them under the command of your venerable fellow citizens near me,* and rushed, rather than marched, to the field of danger, sixteen miles in four hours,—flying into the jaws of death as rapidly as fear commonly lends men wings to fly from it; and contributing,—this single town,—this one little town,—oh, prodigality of noble blood! one sixth of the entire loss of that eventful day. Need I, my friends, for the most touching recollections, go beyond the walls of yonder ancient church, consecrated, as it was, by the strange spectacle, (at the memory of which your tears were called forth afresh, on last year's return of the great anniversary,)—the sight of four of your brave sons wrapped in their bloody shrouds, the honorable wounds which they had received in their country's cause still freshly flowing? Could I before this audience, on such a theme, be wholly mute, would not the gray hairs of the veteran leader of that heroic band, who is now before me,† rebuke my silence, and put a tongue in every echo of this building, which would cry out and shame me!

Yes, fellow citizens, if any thing could make your native land, your homes, your firesides, more dear to you, it must be these recollections of the precious blood by which they were redeemed. If any thing was wanting to inspire you with a passionate attachment to the blessing you enjoy, it would be the thought of the inestimable price at which they were purchased.

Nor let us forget, if we have a patriotic ancestry to be proud of, and if we have privileges to enjoy, we have also incumbent duties to perform. The great principles of republican liberty are exposed to danger in peace as well as in war. Prosperity, not less than trial, may sap the foundation of the social fabric; and there is at all times less danger from a foreign foe, than from party passion, individual selfishness, and general apathy.

It will not, of course, be expected of me to enlarge upon the duties which devolve upon our husbandmen, with a view to guard against these dangers and perpetuate our institutions in their purity. I can but glance at the topic. But I may say, that the first and most important duty of the husbandman, is to endeavor to preserve and if it may be to strengthen, the broad foundation laid by our fathers in a deep religious principle. Surely there is no class of the community whose daily pursuits ought to furnish greater nourishment to the sense of religious things. The reflecting mind, it is true, beholds traces of a higher wisdom and goodness in every step of every walk of life; but the husbandman who drops a seemingly lifeless seed into the cold damp earth, there in great part to decay; who sees the vital germ in a few days pierce the clod, rise into the air, drink the sun's rays and the dews of heaven, shoot upwards and expand, array itself in glories beyond the royal vesture of Solomon, extract from the same common earth and air a thousand varieties of the green of the leaf, the rainbow hues of the petals, the juicy or the solid substance of the fruit, which is to form the food of man and his dependent animals. I say, the intelligent husbandman who beholds this, seems to step behind the veil which conceals the mysteries of creative power, and sit down (if I dare to speak) in the laboratory of Omnipotence.

Connected with the cultivation of the religious principle, and the natural fruit of it, we look to our husbandmen for a high *moral sense*. The worst feature in the degradation of many foreign countries, is the moral condition of those who till the soil, showing itself in the extreme of intemperance and the kindred vices. No man can fully understand this, who has not witnessed it. In the general moral character of our population, we are warranted in saying, that it might serve as an example to the world. I do not think that out of New-England (and I repeat only a remark, which, within a few weeks I have heard several times from persons coming from other parts of the country,) you could assemble a concourse giving so much proof of sobriety, thrift, and industry, as is brought together in this town to-day, and might be assembled, on a similar occasion, in any town in Massachusetts. We look to our

* General Gideon Foster.

† General Foster.

husbandmen, by precept and example to sustain, and if possible elevate, this sound state of morals in the community.

Lastly, that I may say a single word on a subject on which the orator has preceded me. It is a great and just boast of the pilgrims and their descendants, that they made early and ample provision for education. Farmers of Essex, hold fast to that boast. I had rather for the appearance, if I must choose between them, see the country dotted all over, at its cross roads with its plain little village schoolhouses, than have the high places of a few large towns crowned with the most splendid fabrics of Grecian and Roman art. I had rather for the strength and defence of the country,—if I must choose between them,—see the roads that lead to those schoolhouses thronged with the children of both sexes, saluting the traveller as he passes, in the good old New-England way, with their little curtesy or nod, than gaze upon regiments of mercenary troops parading upon the ramparts of impregnable fortresses.—Ay, for the honor of the thing, I had rather have it said of me, that I was by choice, the humblest citizen of the State making the best provision for the education of all its children, and that I had the heart to appreciate this blessing, that sit on a throne of ivory and gold, the monarch of an empire on which the sun never sets. Husbandmen, sow the seed of instruction, in your sons' and daughters' minds. It will grow up and bear fruit, though the driving storm scatter the blossoms of spring, or untimely frost overtake the hopes of autumn. Plant the germ of truth in the infant understandings of your children—save, stint, spare, scrape,—do any thing but steal,—in order to nourish that growth; and it is little, nothing to say, that it will flourish when your grave stones, crumbled into dust, shall mingle with the dust they covered—it will flourish, when that overarching heaven shall pass away like a scroll, and the eternal sun, which lightens it, shall set in blood!

Then follow the Reports of several committees and the annunciation of the successful competitors for the Premiums on the Dairy, on Milch Cows, on Domestic Manufactures, on Cider, on Ploughing, on Bulls, Working Men, Steers, and Calves, on Fruits and Flowers, and on Horses.—These are followed by a valuable communication from Van Mons in improving Fruit Trees translated for the Horticultural Register by Gen. H. A. S. Dearborn, a gentleman distinguished for his scientific and practical skill in Horticulture; and to whose intelligence and public spirit the Horticultural and Agricultural Public are longly indebted. All these purposes are deserving of attention.

Dairy. Ebenezer King, the gentleman who received the highest Premium for his June butter, states "that he presents thirty nine pounds and three quarters made in June; also fourteen pounds made two weeks since: and seven pounds made during the last week (dated Sept. 28th,) the produce of one cow. The cow has given at a milking twenty-six pounds, her feed has been principally ordinary pasture; occasionally she has had three pints of corn meal per day. Her milk has set twenty four hours, when the cream has been separated; has been churned once a week; the butter milk pressed out; and the butter kept in strong pickle."

We subjoin to this account that of Daniel P. King, Esq., on the same subject, a successful competitor, and in all respects, one of the best farmers in the county.

"The Stone jar marked 1, contains about thirty pounds of butter, made in the last week of June from the produce of six cows; they had common pasture feed; only the milk stood in tin pans in a cool cellar thirty-six hours; the cream was then separated, and placed in pots on the cellar floor; in warm weather fine salt is stirred in the cream to prevent its souring. When the butter is taken from the churn, the butter milk is pressed out, it is partially salted and remains in the cellar till the next day, when more salt is added; and it is again worked over; the quantity of salt used is about one oz. to the pound. The butter in the jar has been covered with a pickle, made of rock salt, boiled, and carefully skimmed."

The produce of four cows, as given by Jacob Osgood, of Andover, is thus stated.

New Milk Cheese from the 9th of July, to the 10th of September, 435 lbs.
Butter from 1st of June, to the 9th of July, and 17 days in September, 145 "
Amount of 6 meal cheese made during the time of making butter, 294 "

The cow of Daniel Putnam, which received the first Premium as a milch cow, of native stock, from the amount of her produce, certainly deserved a premium.

"This cow calved May 21. The calf was sold June 20th for $7.62½. During the thirty days that the calf sucked, there were made from her milk 17 lbs. butter. From June 20th to Sept. 26th (14 weeks she gave 3370 lbs. of milk, making a fraction more than 34 lbs. and 6 oz. per day. The greatest quantity on any one day was 45 lbs. or 17 quarts and 1 pint—for the weight of a quart of her milk is 2 lbs. 9 oz. The greatest quantity in one week was 288 lbs. The quantity of butter made in the same fourteen weeks was 139 lbs. The greatest amount in one week was 12 lbs. 2 oz. The cow has had good keeping. In addition to the pasture she has been frequently fed with fresh mown grass and corn stalks. She had about four quarts of cob meal (corn ground on the cob) per day, through the summer."

The Report on Domestic Manufactures gives a long list of premiums, fifty-two of which seemed to have been bestowed, and we have no doubt most justly upon the five seamstresses and knitters of Essex county, for beautiful and useful specimens of their patient handicraft; and presents to those in pursuit of that most useful commodity, an industrious wife, a pretty emphatic recommendation of the fair daughters of this favored district, long distinguished for the intelligence and patriotism of its men; and the virtue and industry of its women. Of this county, the poet may say emphatically

"There is the noblest growth our realms supply;
And souls are ripened in a northern sky."

From the New-England Farmer.

## THIRD ANNUAL REPORT OF THE MANAGERS OF THE BOSTON ASYLUM AND FARM SCHOOL.

The managers of the above institution respectfully submit to the corporation the following report:—

The present board of managers was elected in the month of June last, and this report commences with that period.

The objects of the institution are presumed to be well understood. To rescue from the ills and the temptations of poverty and neglect, those who have been left without a parent's care; to reclaim from moral exposure those who are treading the paths of danger; to "place the solitary in families;" to give to those who know nothing of the ties or influence of home, some taste and fondness for a local habitation, at the least; and to offer to those, whose only training would otherwise have been in the walks of vice, if not of crime, the greatest blessing which New-England can bestow upon her most favored sons, a good education, are some of the purposes for which the Asylum and Farm School was endowed. Under the blessing of God, success has thus far attended the exertions which have been made to accomplish these objects. From the monthly reports of the superintendent, and from the personal examination of the establishment on Thompson's Island, the board of managers are satisfied that there has been much improvement in the character of the boys who have been committed to the charge of the institution. In the last report of the superintendent, 62 boys are placed in the highest or first grade, 40 in the second, 4 in the third, and 1 in the fourth.

The number of boys on the island at the time of the last report, was 92; since that time 18 boys have been admitted, and three withdrawn. The number on the 1st of January, 1837, was 107; all of whom, as well as all other persons connected with the establishment on the island, were in good health, and there has been no death at the institution since the last report was made. The occupations and employment of the boys vary with the season. In spring, summer and autumn, the larger boys, in classes, work upon the garden and farm, of whose labor they perform a large part. The younger boys have small gardens of their own, which afford them recreation when released from school. In the winter season most of them attend school, where they are instructed in the learning usually taught in our common schools, and some of them assist in making clothes and mending shoes. The winter evenings are occupied with the study of geography, and the use of globes; botany, and practical agriculture; lecturing on different subjects, singing and reading.—The superintendent states that "every boy in the institution is required to be present during the evening exercises, if he is able, which are very pleasing to them, and which we all enjoy very much."

A large number of mulberry trees have been planted upon the island, and there are many silk worms at the establishment. It

is contemplated to improve the advantages of the location in the production of raw silk for manufacture.

As to the success of the boys in the farming operations, Capt. Chandler, the superintendent, says, "they have succeeded far beyond my expectations; I think they have done more work, and done it better, than the boys of their age who have been regularly brought up to the business in the country generally do." And as to the comfort and contentedness of the boys, he says, "they are all comfortably clad with woollen clothes, shoes, stockings and caps, and appear to be as happy in their present situation as boys generally are under the paternal roof. They appreciate their advantages, and most of them are grateful to the benefactors of the institution and their friends for placing them here. The boys are well supplied with books, and keep them in excellent order; our library contains between 4 and 500 volumns of well selected books. I have also an agricultural library containing about 30 volumns, to which the boys have access." Opportunities are occasionally offered to the friends of the boys at the institution, of visiting them on the island in the summer months.

The school is under the immediate charge of Mr. George B. Hyde, and he as well as the superintendent and all engaged in the establishment, are believed to merit the continuance of the confidence which has hitherto been reposed in them.

During the past summer, several parties of ladies and gentlemen, at the request of the board of managers, visited Thompson's Island. At these visits there have been many persons present, and an examination of the boys in their different studies has been accompanied by some remarks on the objects and prospects of the institution.—Among these who have thus visited the island, have been many strangers, who have always expressed their interest and pleasure in its objects and condition.

And how should it be otherwise than an object of interest; an institution designed to rescue the destitute orphan boys of our city from vice and ruin; to withdraw them from scenes and associates, whose contaminating influence would quickly destroy the perceptions of conscience, and leave them, deprived of that monitor, to pursue the impulses of passions which inevitably destroy their victims. Many are the worthy objects of the charitable institutions among us; our hospitals relieve the sufferings of the sick, and restore them to health and usefulness; they are a blessing which may be required by all of us, and we would not detract from their deserts. But we conceive that an institution which is to rescue immortal beings from the stain of sin, which could hardly otherwise be avoided, which is intended to have an influence on the youthful mind, and lead it to an understanding of its own capacities, responsibilities and hopes, deserves the fostering care of an enlightened, benevolent community, as much as those associations whose aim is to cure the diseases of the body, or to restore the wanderings of intellect. Such an institution as the Asylum and Farm School, is in true accordance with the spirit of the pilgrims; it carries into effect the first objects of their solicitude, the education of the young—of that young whose talents would otherwise be employed to violate the peace and virtue of society.

It will be seen by the report of the finance committee, that the expenses of the institution for the year ending January 1, 1837, have amounted to $6,100, while the receipts for the same time have amounted to 3,500, leaving a deficiency of $2,600. To meet this excess of expenditure over income, and to prevent its recurrence, it will be necessary to appeal to the liberality of the public. The board of managers had intended to have made that appeal in the autumn of the past year; but the condition of the financial affairs of this community induced them to defer it. They would recommend the subject to their successors as one requiring their attention when a suitable time shall have arrived for its execution, with the confidence that the appeal will be cheerfully and promptly answered.

For the managers.

WILLIAM GRAY.

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COOKING POTATOES.—This is no inconsiderable art; and I have some suspicion that Cobbett's ignorance of the best way of doing this may have been one reason of his antipathy to the use of this esculent. The direction given by one writer is, never to put your potatoes into cold but boiling water; and keep it boiling until the potatoes are done or sufficiently boiled; then pour off the water as soon as possible; if a little salt be thrown into the water when boiling, the better." We will add a better mode than this, which has been so thoroughly and successfully tested, that we believe it cannot fail to be approved: Select the potatoes you design for dinner the day previous; pare them and throw them into cold water and let them stand three or four hours; then, at a proper time before dinner, put them into boiling water; and when they have sufficiently boiled, turn off all the water, leave off the cover and hang them over the fire to dry. When the steam has passed off they will then be in the best possible condition for eating. By this mode, potatoes even of a watery and inferior quality, become mealy and good. H. C.

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## Advertisements.


FOR SALE AT THIS OFFICE,

*A Practical Treatise on Locomotive Engines*, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cts. for any distance exceeding 100 ms.

ALSO—*Van de Graaff on Railroad Curves*, done up as above, to be sent by mail—Price $1. Postage, 20 cents, or 30 cents, as above.

ALSO—Introduction to a view of the works of the *Thames Tunnel*—Price *fifty cents*. Postage as above, 8 cents, or 12 cts.

*** On the receipt of $3, a copy of each of the above works will be forwarded by mail to any part of the United States.

DRAWING INSTRUMENTS.—E. & G. W. Blunt, 154 Water-street, New-York, have received, and offer for sale, Drawing Instruments of superior quality, English, French, and German Manufacture.

They have also on hand Levels of superior quality at low prices.

☞ Orders received at this office for the above Instruments.

AVERY'S ROTARY STEAM ENGINES.—AGENCY.—The subscriber offers his services to gentlemen desirous of procuring Steam Engines for driving SAW-MILLS, GRAIN-MILLS, and OTHER MANUFACTORIES of any kind.

*Engines only* will be furnished, or accompanied with *Boilers* and the necessary *Machinery* for putting them in operation, and an Engineer always sent to put them up.

Information will be given at all times to those who desire it, either by letter or by exhibiting the engines in operation in this city.

Inquiries by letter should be very explicit and the answers shall be equally so.

D. K. MINOR,
30 Wall-st., New York.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

A COURSE OF INSTRUCTION IN CIVIL ENGINEERING, by informal lectures, to occupy two months, commencing the 1st week of May.—Comprising

The use of the theodolite, level, Compass plain table, cross, and sextant explained upon the instruments themselves: topographical drawing executed under supervision; survey of routes; problems of excavation and embankment; railroad curves; all the usual details of construction upon common roads, railroads, and canals; including bridges, culverts, tunnels, and the various kinds of motive power; nature, strength and stress of materials; masonry, carpentry and constructions in iron; alluvial deposites, guaging of streams, &c.—The whole purely elementary. Terms of admission to the course, $20.

Apply to C. W. Hackley, Professor of Mathematics in the University, 32 Waverly Place.

## TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S—The valley of James River above Richmond is healthy.

16—10t

## PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

## TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August nex, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

## ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

## FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawaukeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakichill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

## ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

## NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

## AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

## STEPHENSON,

*Builder of a superior style of Passenger Cars for Railroads.*

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

## TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

## RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

| | | | | | | | lbs. | |
|---|---|---|---|---|---|---|---|---|
| 350 tons | 2½ | by | ½, | 15 ft | in length, | weighing | $4\frac{68}{100}$ | per ft. |
| 280 " | 2 | " | ½, | " | " | " | $3\frac{50}{100}$ | " |
| 70 " | 1¾ | " | ½, | " | " | " | 2¼ | " |
| 80 " | 1½ | " | ½, | " | " | " | $1\frac{25}{100}$ | " |
| 90 " | 1 | " | ½, | " | " | " | ½ | " |

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companes.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2¾ 3, 3¼, 3½, 3¾, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

## ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—vtf H. R. DUNHAM & CO.

## MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callendors; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf